CHARLES COUNTY, MARYLAND

Comprehensive Solid Waste Management Plan *2000-2010*

Adopted
April 23, 2001

Commissioners of Charles County

Murray D. Levy, President
Robert J. Fuller
James Jarboe
Daniel Mayer
Allan R. Smith

Charles County Government Mission Statement

To provide our citizens the highest quality service possible in a timely, efficient, and courteous manner. To achieve this goal, the government must be operated in an open and accessible atmosphere, be based on comprehensive long and short range planning, and have an appropriate managerial organization tempered by fiscal responsibility.

Vision Statement

Charles County is a place where...

- *Private initiative is rewarded and businesses grow and prosper, while the preservation of our heritage is paramount;*
- *Government Services has reached the highest level of excellence; and*
- *The quality of life is felt by its citizens to be the best in the region and its government is recognized as a leader in support of these expectations*

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CHARLES COUNTY, MARYLAND

COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN 2000-2010

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INTRODUCTION

I.1 STATE REGULATORY REQUIREMENTS & CONFORMITY WITH *COMAR*

Solid waste management regulations and policies exist at the federal, state, and local government levels. Traditionally, the federal government has provided the overall regulatory direction and minimum national standards for protecting human health and the environment. The implementation of these regulations is the responsibility of the state and local governments.

The Maryland Department of the Environment (MDE) administers and implements federal and state solid waste management regulations. Each county is required to prepare and adopt a solid waste management plan which addresses a 10 year planning period. The plan is to be reviewed and updated, if necessary, by the county every 3 years. Upon adoption by the county, the plan is then submitted to MDE for approval.

The *Charles County, Maryland Comprehensive Solid Waste Management Plan 2000 - 2010*, was prepared in accordance with the requirements of the *COMAR* 26.03.03, a copy of which is provided in Appendix A.

I.2 CHARLES COUNTY RESOLUTION ADOPTING PLAN

The governing authority is the Charles County Commissioners. The *Charles County Comprehensive Solid Waste Management Plan* was approved and adopted by the Charles County Commissioners as stipulated in Resolution *2001-68* dated *April 23, 2001*.

I.3 MDE APPROVAL LETTER

The letter approving this *Charles County Comprehensive Solid Waste Management Plan* from the Maryland Department of the Environment follows.

I.4 NATIONAL TRENDS AND FACTORS INFLUENCING SOLID WASTE MANAGEMENT

More solid waste is produced in the United States of America than any other country. Solid waste generation has almost doubled in the last 20 years despite the increased public awareness of the necessity for waste reduction.

This increase is not only the direct effect of increased population, but the effect of an increase in the per capita waste generation. We generated a daily average of 2.6 pounds of trash per person 20 years ago; today we produce an average of 4.0 pounds.

As a nation, our previous disposal practices underestimated the importance of solid waste management. Improper planning, design, operation, and maintenance of our landfills and incinerators provided a source of air, water, and soil contamination. Today, we realize that appropriate planning, design, operation, and maintenance are essential to reduce the potential of adverse environmental impacts from solid waste facilities.

Throughout our country, many existing landfills and incinerators will close due to stricter regulations. Numerous landfills are nearing capacity; therefore, the need to site new landfills is immediate. However, new landfill sites are limited due to stricter regulations, public concerns, costly environmental controls, and limited space in densely populated areas. Landfill capacity in the older, densely populated areas of the Northeast is declining. An increasing amount of waste generated in the Northeast is being transported to Midwestern and Southern States for disposal.

I.5 PURPOSE AND SCOPE OF PLAN

The highest priority of this Plan, as established by the Charles County Department of Planning, Charles County Department of Public Facilities (Solid Waste Division) and the Charles County Commissioners, is to ensure the conservation of resources and protection of the environment by maximizing waste reduction and recycling, thus minimizing the requirement for disposal facilities.

An equally important priority is the establishment of tighter county and local control over the permitting and operation of required solid waste management facilities. This monitoring program will encourage adherence to permit requirements and serve to inform the county staff and residents of the activities at these facilities.

Charles County will use this document as a planning tool for solid waste management during the next decade. The Plan provides the framework that will be relied upon to make numerous decisions on the implementation of required capital construction and management programs for the next 10 years. It is the intent of this Plan to develop and articulate issues that must be addressed in order to focus the community on the goals and objectives and concepts of solid waste management through open and active public participation. When consensus is reached through this process; additional planning, engineering, and community involvement will define the specific settings, technologies, regulations, and policies needed to achieve these goals and objectives. This Plan will be continuously updated to reflect these specific decisions as they are approved.

I.6 PLAN ORGANIZATION

The *Charles County Comprehensive Solid Waste Management Plan* addresses the management of solid waste including generation, waste reduction, collection, transportation, processing, and disposal. Ultimately, this document will provide Charles County with a plan of action during the 10-year planning period. Topics to be included for discussion in the solid waste management plan are outlined in *COMAR* 26.03.03.03. A listing of these topics and a cross reference for locating topic discussions is provided prior to this introduction. This Plan contains an introduction, five chapters, a glossary of terms, and a list of references. A brief summary of the five chapters follows.

I.6.1 Chapter 1 -- Goals and Regulatory Framework

The goals and objectives guiding solid waste management in Charles County are presented in this chapter. The intent of these goals and objectives is carried through to the evaluation of alternatives

and the formulation of recommended actions in Chapters 4 and 5. The procedure to amend this Plan is also presented in this chapter.

The planning and decision-making process governing solid waste management facilities and issues in Charles County is guided by regulatory requirements and input from the public. This chapter describes the structure of Charles County Government as it relates to solid waste management, and the impact of existing federal, state, and county regulations on the planning, establishment, and operation of solid waste disposal systems in the County. Additionally, a general description of public involvement in the planning and decision-making process for solid waste management facilities is presented.

I.6.2 Chapter 2 -- County Background Information

General historical and geological information for Charles County is presented. A description of the regional setting and history provides the background for discussing the effect of growth on the provision of solid waste management services and facilities.

Population projections for the County are presented in this chapter. These projections are the basis for the prediction of solid waste generation and the sizing of solid waste management facilities. Also, there is a summary of the current requirements and policies in the County's comprehensive plan and zoning requirements relating to solid waste management.

I.6.3 Chapter 3 -- Existing Solid Waste Management

The purpose of this chapter is to compile a data base on current solid waste management in Charles County and to serve as a baseline for the development of recommendations in the following chapters. An analysis of the Charles County waste stream is provided, including historic data, projections of waste generation, waste stream composition, imported wastes, and exported wastes. A description of the existing collection systems for solid waste and recyclables, the current recycling program, and existing and proposed solid waste management facilities is also provided.

I.6.4 Chapter 4 -- Assessment of Solid Waste Management Alternatives

Using the data presented in the first three chapters, an assessment of the adequacy of existing and planned management facilities regulations and policies to meet the goals and objectives for the planning period is presented. Alternatives available to meet identified deficiencies are evaluated. In addition, a review of siting constraints for solid waste facilities within the County is presented.

I.6.5 Chapter 5 -- Solid Waste Management Plan of Action for 2000 - 2010

Based on the assessment of needs and alternatives presented in Chapter 4, a solid waste management action plan for Charles County is presented. The recommended plan includes the sizing and staging of needed management facilities, organization of the collection system for waste and recyclables, and

required modifications to county policies and regulations during the 10-year planning period. Cost projections and methods to finance the recommended plan are also presented.

CHAPTER 1

GOALS AND REGULATORY FRAMEWORK

1.1 CHAPTER SUMMARY

Chapter 1 presents the goals and regulatory framework for establishing a Solid Waste Management Plan for Charles County for the period 2000 to 2010. The essence of the planning process centers on developing realistic goals and objectives as well as accurately defining the regulatory requirements.

Topics discussed in this chapter include: Charles County goals, objectives and policies; the general structure of the Charles County Government as it relates to solid waste management; and public participation in the planning and implementation of the Plan. This chapter also describes the impact of federal, state, and County regulations on the planning, establishment, and operation of solid waste facilities in Charles County. The requirements and procedures to amend this Plan are also provided in this chapter.

1.2 GOALS, OBJECTIVES, AND POLICIES

Goals, objectives, and policies are fundamental elements for developing an effective and efficient solid waste management plan. Broad, generalized statements which reflect the values of the County are defined as the goals of the plan. Goals represent the fundamental desires and visions for the management of solid waste within Charles County. The goals are attainable by accomplishing specific objectives.

The four goals considered critical in developing the *Charles County Comprehensive Solid Waste Management Plan* include the following:

- Preservation and protection of the environment;
- Protection of human health and safety to provide a quality living environment;
- Providing a cost-effective and self-sufficient solid waste management program;
- Promote recycling and reuse of materials throughout the County.

Table 1-1 lists the goals and objectives for the management of solid waste in Charles County. Several common themes are developed in the goals and objectives, the foremost of which is to maximize the available landfill space by continuing and expanding environmentally-sound waste management technologies, including waste reduction, reuse, and recycling.

TABLE 1-1

SOLID WASTE MANAGEMENT GOALS AND OBJECTIVES

GOALS

1. Preserve and protect the natural environment.
2. Protect human health and safety, and provide a quality living environment.
3. Provide a cost-effective, self-sufficient solid waste management program.
4. Promote recycling, waste reduction, and reuse of materials throughout the County.
5. Continue to explore the feasibility of the use and/or sale of methane gas.

OBJECTIVES

A. COLLECTION

1. Ensure that adequate solid waste collection services are available to all county citizens and commercial establishments at a reasonable cost.
2. Re-evaluate the feasibility of providing disposal transfer boxes at county recycling centers.

B. WASTE REDUCTION AND RECYCLING

3. Promote the expansion of solid waste reduction, reuse, and recycling through diligent implementation of the approved *Charles County Comprehensive Solid Waste Management Plan*.
4. Examine the use of innovative technology to reduce the reliance on landfilling solid wastes.
5. Achieve and/or exceed a county-wide recycling rate of twenty-five (25) percent.

C. LAND DISPOSAL

6. Provide continuous disposal capacity within the County for municipal solid waste and rubble, in an environmentally protective manner.
7. All landfills shall be owned and operated by Charles County Government.

D. SPECIAL WASTE MANAGEMENT

8. Continue the ongoing *Charles County Household Hazardous Waste Program*.
9. Manage and regulate sludge storage and land application to ensure environmental and land use compatibility.

TABLE 1-1

SOLID WASTE MANAGEMENT GOALS AND OBJECTIVES
(continued)

E. MISCELLANEOUS

10. Eliminate roadside dumps, and prevent the establishment of new roadside dumps; establish an effective litter control program.

11. Pursue regional solutions for solid waste management problems, as feasible.

12. Achieve and maintain compliance with all federal, state and county regulatory requirements; develop a monitoring system to ensure continued compliance.

13. Establish a comprehensive public information and involvement program for solid waste issues, including facility siting, permitting, operation, waste reduction, reuse, and recycling.

14. Establish a financing structure that will adequately fund all required solid waste facility capital construction, operations, and administration expenditures.

15. Provide a mechanism for regularly updating the *Charles County Solid Waste Management Plan* to ensure future demands for services are efficiently met; provide an annual progress report.

16. Encourage public/private partnerships to help meet the demand for solid waste management facilities and services.

17. Link solid waste services to cost in the market place.

18. Establish a solid waste management facility siting policy; conduct site selection studies, as required, to ensure required facilities may be constructed as needed.

In pursuing this strategy, the County affirms its commitment to foster public involvement in solid waste management issues, to protect the environment by developing a state-of-the-art landfill maximizing environmental protection, and to ensure a future source of funding for its solid waste management program. Charles County will develop policies to guide the direction of solid waste. Management policies must be recorded, scrutinized, and revised so that they are compatible with the goals and objectives of the solid waste management plan. The County recognizes that in order to implement the goals and objectives of this Plan, policies will need to be developed. Solid waste management policies will be added to the Plan by amendment.

1.3 STRUCTURE OF COUNTY GOVERNMENT

Charles County is governed by elected County Commissioners who enact all County ordinances, establish an annual operating and capital budget, and perform all legislative functions, including the adoption of the *Charles County Comprehensive Solid Waste Management Plan*. The Department of Planning and Growth Management prepares and coordinates the solid waste management plan and its amendments while the operation of the landfill and the recycling program is conducted within the Department of Public Facilities, Solid Waste Division. The overall County government structure is illustrated in Figure 1-1. The Chief of Solid Waste oversees the operation of the landfill and the recycling program. As shown on Figure 1-2, the Solid Waste Department has a staff of 32 full-time employees and several part-time employees.

1.4 PUBLIC PARTICIPATION

Goals and objectives for the Charles County Comprehensive Solid Waste Management Plan were established as a joint effort among the Charles County Department of Planning and Growth Management, Charles County Department of Public Facilities, Charles County Commissioners, and citizen input.

1.5 LAWS AND REGULATIONS GOVERNING MANAGEMENT FACILITIES

Solid waste management laws and regulations exist at the federal, state, and county levels. Overall, regulatory direction and minimum nationwide standards for protecting human health and the environment are established at the federal level. State regulations meet or exceed those mandated by federal regulations. State regulations specify minimum design criteria and the permitting, construction, operation, maintenance, and monitoring requirements for many solid waste management facilities. County regulations must be compatible with federal and state laws and regulations, but may augment federal and state laws and regulations. The more specific issues of land use, zoning, procurement, financing, and operation related to solid waste management facilities are left entirely to the County to regulate.

Descriptions of responsible agencies, responsibilities, and the applicable federal, state, and county laws and regulations are discussed in the following paragraphs.

FIGURE 1-1

CHARLES COUNTY GOVERNMENT ORGANIZATIONAL CHART

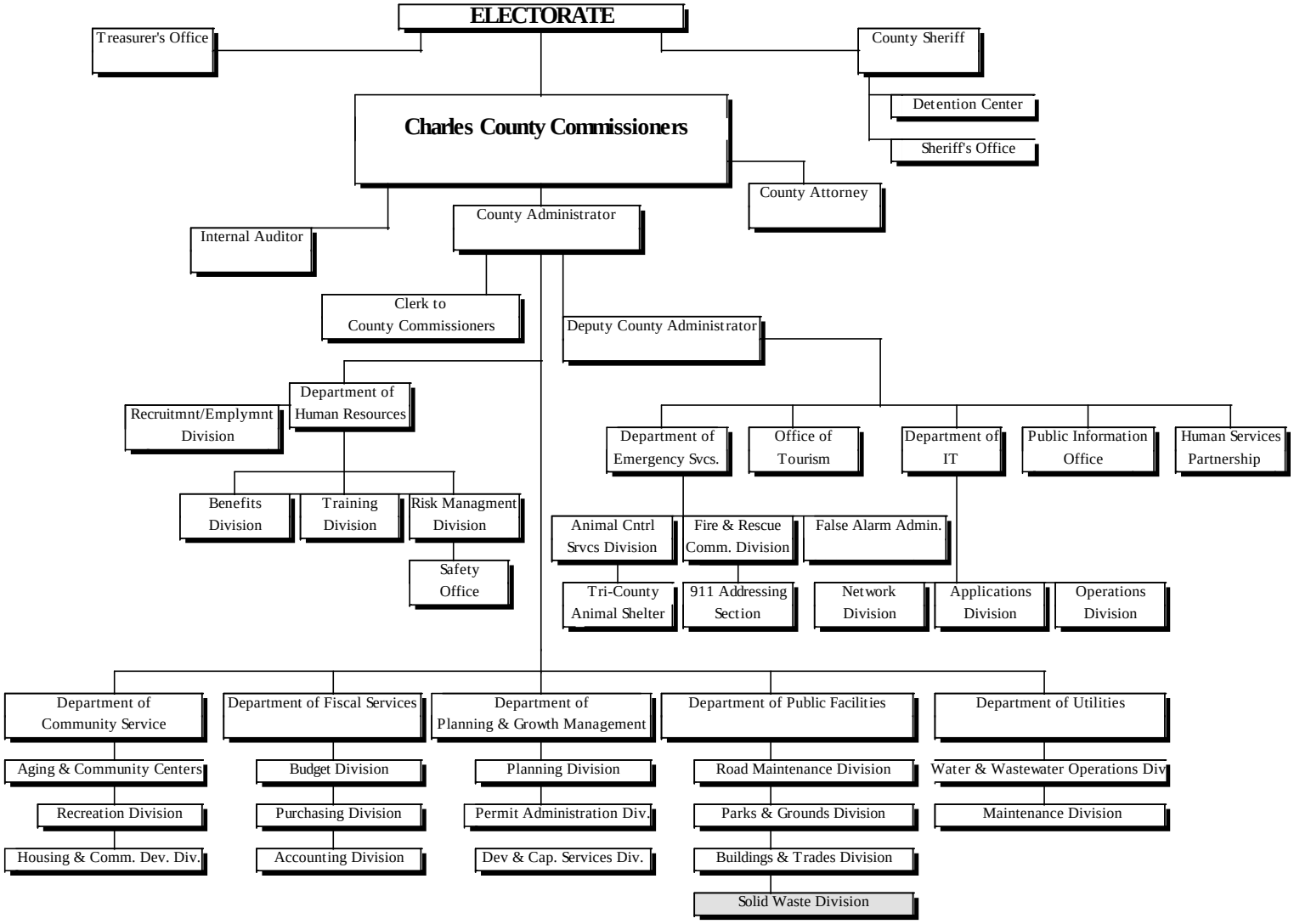
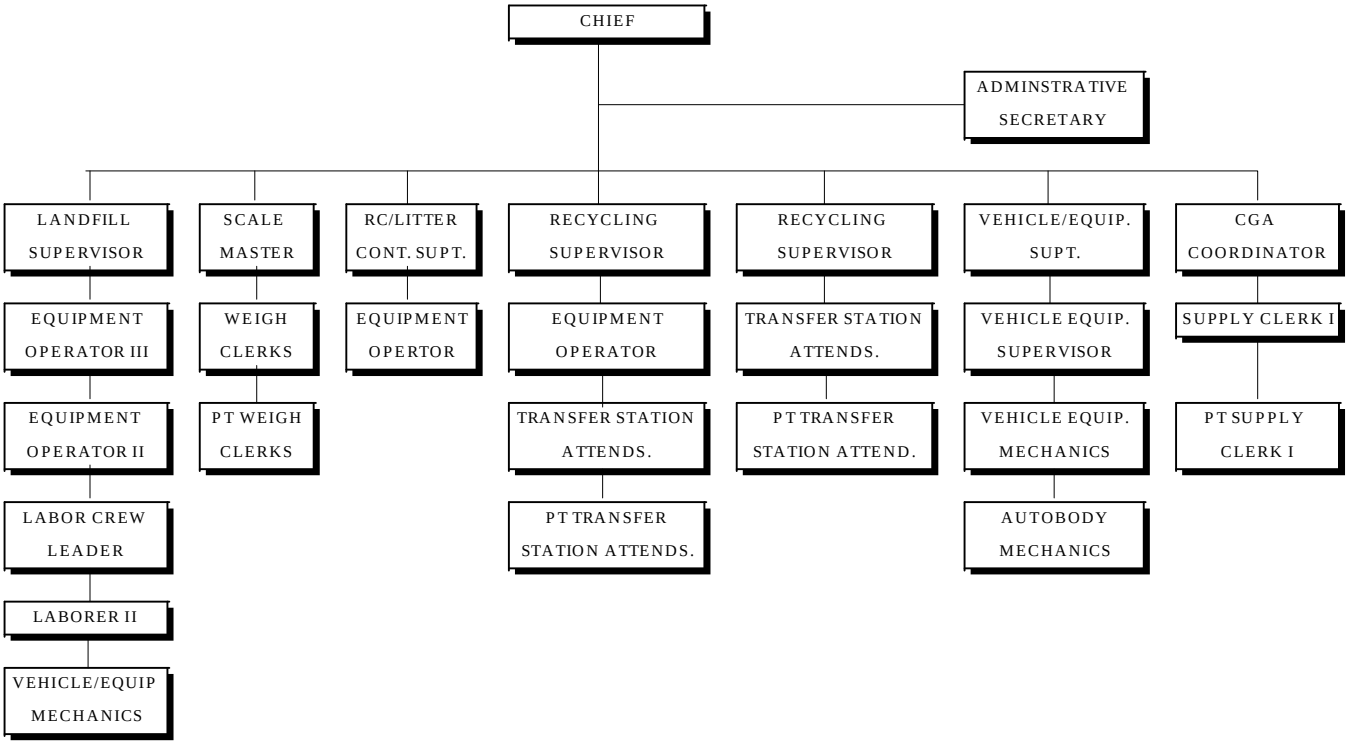


FIGURE 1-2

CHARLES COUNTY SOLID WASTE DIVISION ORGANIZATION



1.5.1 Federal

Table 1-2 provides a summary of applicable federal laws, judged to be most significant, regulating solid waste. Foremost among those laws is the *Resource Conservation and Recovery Act (RCRA)* of 1976, amended in 1980 and 1984, that provides federal guidelines and standards for the environmentally sound reuse, handling, and disposal of solid waste. The act requires that states incorporate these guidelines into their solid waste management programs. Under *RCRA* provisions, *Subtitle D* provides federal standards for municipal sanitary landfills. These standards include the location, design, operation, groundwater monitoring, corrective action, closure, post-closure, and financial assurance criteria for all municipal sanitary landfills.

The *Code of Federal Regulations (CFR)* provides documentation of the rules established in the Federal Register by the executive departments of the federal government. The Code is divided into 50 titles which are further divided into chapters and subparts thereof. *CFR Title 40* is titled *Protection of the Environment*, which includes *Sub-chapter I-Solid Wastes* (Parts 240 through 272).

Solid waste management, on the federal level, is the responsibility of the United States Environmental Protection Agency (EPA). Federal regulations establish overall regulatory direction and minimum nationwide standards for protecting human health and the environment. Direct implementation of solid waste programs is delegated to state and local governments. A summary of federal regulations important to solid waste management contained in *CFR, Title 40, Subchapter I - Solid Wastes* is provided in Table 1-3.

In addition, *CFR Title 40 (258)* places restrictions on siting waste disposal facilities near airports. This code provides guidance concerning the establishment of new landfills in the vicinity of airports and stipulates that the following criteria must be met for sanitary landfills:

- Waste disposal sites may not be located within 10,000 feet of any runway end (used or proposed) to be used by a turbine powered aircraft.

- Waste disposal sites may not be located within 5,000 feet of any runway end used only by piston powered aircraft.

- Waste disposal sites may not be located within a five-mile radius of a runway end that attracts or sustains hazardous movements from feeding, water, or roosting areas into, or across the runways and/or approach and departure patterns of aircraft.

TABLE 1-2

SUMMARY OF FEDERAL LAWS AFFECTING SOLID WASTE MANAGEMENT

Resource Conservation and Recovery Act:

A primary objective of this act is to promote recycling and reuse of recoverable materials. The act also provides guidelines for environmentally-sound handling and disposal of both hazardous and non-hazardous solid waste. Subtitle D of the act specifies criteria for municipal solid waste landfills.

Comprehensive Environmental Response, Compensation and Liability Act (Superfund):

Establishes programs for the identification and remediation of waste disposal sites containing hazardous substances; establishes standards for clean-up efforts and disposal of wastes; and provides a mechanism for assigning liability for contaminated sites.

Clean Water Act:

Section 402 of this act establishes the National Pollutant Discharge Elimination System (NPDES) program which regulates effluent limitations for the discharge of wastewater and runoff from solid waste management facilities into bodies of water. The construction of facilities which may impact rivers, lakes, marshes, swamps, or wetlands is regulated by Section 404 which is administered by the Army Corps of Engineers. Section 405 addresses the disposal of wastewater treatment sludge.

Clean Air Act:

Regulates emissions from landfill gas management systems and resource recovery facilities. Landfill operators must comply with requirements of the State implementation plan established under Section 110.

Safe Drinking Water Act:

Establishes maximum contaminant levels for parameters included in groundwater monitoring programs.

Federal Emergency Management Act:

Prohibits siting of facilities within the 100-year floodplain.

Endangered Species Act:

Prohibits construction or operation of facilities that would result in the "taking" of an endangered or threatened wildlife species, or in the destruction of their critical habitat.

TABLE 1-3

SUMMARY OF FEDERAL REGULATIONS AFFECTING SOLID WASTE MANAGEMENT (CFR, TITLE 40, SUB-CHAPTER I)

Part 240: Guidelines for the Thermal Processing of Solid Wastes

Minimum performance level for municipal solid waste incinerators with a capacity of 50 tons per day, or greater.

Part 241: Guidelines for the Land Disposal of Solid Wastes

Minimum performance levels for any municipal solid waste disposal site operation.

*Part 243: Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Waste**

Minimum performance levels for solid waste collection operations. Issues addressed include storage, safety, equipment, frequency, and management.

*Part 244: Management Guidelines for Beverage Containers**

Minimum actions for reducing beverage container waste; covers use of returnables, information requirements, and implementation.

*Part 245: Promulgation of Resource Recovery Facilities Guidelines**

Guidelines for the recovery of resources from residential, commercial, and institutional solid wastes, including regionalization and planning techniques.

*Part 246: Source Separation for Materials Recovery Guidelines**

Minimum actions for the recovery of resources from solid wastes, including high-grade paper, residential materials, and corrugated containers.

Part 247: Guidelines for the Procurement of Products That Contain Recycled Materials

Recommended guidelines for procedures that can be used in the specifications for procurement of products to increase the use of recycled materials.

Part 255: Identification of Regions and Agencies for Management

Procedures for the identification of regional solid waste management planning districts pursuant to Section 4002(a) of the Solid Waste Disposal Act.

Part 256: Guidelines for Development and Implementation of State Management Plans

Guidelines for development and implementation of State solid waste management plans.

Regulations marked with an asterisk (*) are mandatory for federal agencies and recommended for state and local governments.

TABLE 1-3

SUMMARY OF FEDERAL REGULATIONS AFFECTING SOLID WASTE MANAGEMENT
(continued)

Part 257: Criteria for the Classification of Disposal Facilities and Practices

Criteria to determine which solid waste facilities pose a reasonable probability of adverse effects on health or the environment. Facilities in violation will be considered open dumps. Does not apply to municipal landfills (covered under Section 258).

Part 258: Criteria for Municipal Landfills (Subtitle D Regulations)

Establishes minimum national criteria for the design and operation of municipal solid waste landfills. Includes location restrictions, operating criteria, design criteria, groundwater monitoring and corrective action, closure and post-closure care, and financial assurance criteria. Design standards apply only to new landfills and lateral expansions of existing facilities.

Part 260: Hazardous Waste Management System - General

Provides definitions of terms and a general overview of Parts 260 through 265.

Part 261: Identification and Listing of Hazardous Waste

Provides identification of those materials which are subject to regulation as hazardous wastes under Parts 270, 271, and 124.

Part 262: Standards Applicable to Generators of Hazardous Waste

Establishes standards for generators of hazardous wastes including EPA identification numbers, manifest, pre-transportation requirements, record keeping, and reporting.

Part 263: Standards Applicable to Transporters of Hazardous Waste

Establishes regulations for transporters of materials requiring a manifest as defined in Part 262.

Part 264: Standards for owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

Establishes minimum national standards for the management of hazardous waste.

Part 265: Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

Establishes minimum national standards that define the management of hazardous wastes during the period of interim status and until the certification of post-closure or closure of the facility.

TABLE 1-3

SUMMARY OF FEDERAL REGULATIONS AFFECTING SOLID WASTE MANAGEMENT
(continued)

Part 266: Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Disposal Sites

Establishes minimum national standards for the recyclable materials used in a manner to constitute disposal, hazardous waste burned for energy recovery, used oil burned for energy recovery, recyclable material used for precious metal recovery, and spent lead-acid batteries being reclaimed.

Part 267: Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities

Establishes minimum national standards which define the management of hazardous waste for a new land disposal facilities.

Part 268: Land Disposal Restrictions

Identifies a schedule to evaluate listed wastes for prohibition of land disposal and establishment of treatment standards for these wastes.

Part 270: EPA Administered Permit Programs: The Hazardous Waste Permit Program

Application requirements, standard permit conditions, monitoring, and reporting requirements for EPA permitting for the treatment, storage, and disposal of hazardous waste.

Part 271: Requirements for Authorization of State Hazardous Waste Programs

Identifies the requirements that state programs must meet to fulfill interim and final authorization as well as the procedures EPA uses to approve, revise, and withdraw approval of State programs.

Part 272: Approved State Hazardous Waste Programs

Establishes the applicable State hazardous waste management programs.

Part 503: Sewage Sludge Regulations

Requirements and standards for the treatment, land application, surface disposal, and incineration of sewage sludge.

Regulations marked with an asterisk (*) are mandatory for federal agencies and recommended for state and local governments.

1.5.2. State

The State of Maryland has adopted a number of laws that address solid waste management issues. The development of recycling programs in Charles County is governed by the following laws:

- Maryland Recycling Act
- Telephone Directory Recycling Act
- Composting Act
- Newsprint Recycled Content Act
- Plastic Material Code Act
- Mercury Oxide Battery Act

A summary of the State laws affecting solid waste management is provided in Table 1-4. State laws are codified under the articles of the *Annotated Code of Maryland*. Laws addressing solid waste management are included throughout the code; the *Title 9 Environment Article* contains many of the laws affecting the location, design, and operation of solid waste disposal facilities. These laws are developed into regulation by the agency to which the responsibility is delegated by the State Legislature. Table 1-5 provides an abbreviated summary of the *Annotated Code of Maryland* titles affecting solid waste management.

Administrative rules and regulations adopted by State agencies pursuant to State laws are compiled into a document entitled *Code of Maryland Regulations* (*COMAR*). *Title 8* contains the regulations of the Maryland Department of Natural Resources (DNR) which must be considered when siting solid waste facilities. *COMAR Title 26* contains the administrative rules and regulations for MDE including solid waste management regulations. The full description of *Title 26, Chapter 3* is presented in Appendix A. A summary of the regulations which affect solid waste management is provided in Table 1-6.

1.5.2.1 Maryland Department of the Environment

The MDE is the primary State agency having responsibility for solid waste management within the State of Maryland. MDE implements federal and state solid waste regulations, and enforces Maryland environmental regulations addressing surface water and groundwater protection, erosion and sediment control, preservation of wetlands, and recycling. MDE reviews solid waste facility plans and management plans, issues permits, and inspects facilities.

MDE issues permits for the various types of waste facilities that could be sited in Charles County including sanitary landfills, land-clearing debris landfills, rubble landfills, processing facilities (e.g., materials recovery facilities, recycling centers, rubble processing facilities, etc.), transfer stations, incinerators, and industrial and hazardous waste landfills. Industry and the private sector are responsible for permitting and providing industrial and/or hazardous waste facilities for disposal of their wastes, as required. One way that Charles County is able to regulate industrial and hazardous waste facilities is through public review of permit applications for waste management facilities.

TABLE 1-4

SUMMARY OF MARYLAND LAWS AFFECTING SOLID WASTE MANAGEMENT
Title 9 Environment Article, Annotated Code of Maryland

Maryland State Implementation Plan (SIP):

Limits emissions from specific pollutant sources to prevent air quality from falling below National Ambient Air Quality Standards (NAAQS).

Nontidal Wetland Regulations:

Prevents net loss of nontidal wetlands by establishing a stringent permitting process.

Chesapeake Bay Critical Area Protection Program (1984):

Controls human intervention in the Chesapeake Bay drainage area.

Maryland Recycling Act (1988):

Establishes a requirement for Maryland counties to plan and implement a recycling system by 1994. Charles County was mandated to reduce the County's waste stream by 15 percent.

Maryland State Senate Joint Resolution 6 (2000):

Established a voluntary statewide diversion of goal of 40% by the year 2005 in order to reduce the amount of waste going to solid waste disposal facilities.

Asbestos Control - Asbestos Hazard Emergency Response Act (1990):

Requires completion of a teaming program by those who do asbestos-related work within schools; deals with asbestos controls.

Land-clearing Debris Landfills - Amount of Surety (1990):

Addresses the amount of surety required for each acre of land-clearing debris landfills.

Newsprint Recycled Content Act (1991):

Regulates newsprint recycling by imposing specified recycling content percentage requirements on the Maryland newspaper industry.

Telephone Directory Recycling Act (1991):

Regulates telephone directory publishers to meet specified recycling content percentage requirements for telephone directories.

Plastic Material Code (1991):

Bans rigid plastic containers or bottles from distribution or sale in the State unless appropriately labeled indicating the plastic resin used to produce them.

TABLE 1-4

SUMMARY OF MARYLAND LAWS AFFECTING SOLID WASTE MANAGEMENT
Title 9 Environment Article, Annotated Code of Maryland
(continued)

Composting Act (1992):

Includes composting in the definition of recycling. Requires that County recycling plans address composting issues, and bans yard waste from landfills effective in 1994.

Mercury Oxide Battery Act (1992):

Makes battery manufacturers responsible for collection, transportation, and recycling or disposal of batteries sold or offered for promotional purposes in the State.

Sludge Application:

Regulates land application procedures to maintain the public health.

Medical Waste Legislation:

Regulates identification, record keeping, treatment, transport, and disposal of special medical wastes; infectious wastes are prohibited in solid waste landfills in the State.

Natural Wood Waste Recycling Facilities (1991):

Wood waste recycling facilities must be appropriately permitted and operated, and may accept only natural wood waste.

Scrap Tire Recycling Fees:

Regulates the storage of scrap tires, including prohibition against landfill disposal or scrap tires after January 1, 1994; establishes tire recycling fee on new tires sold in Maryland.

TABLE 1-5

SUMMARY OF SECTIONS OF *THE ENVIRONMENT ARTICLE, ANNOTATED CODE OF MARYLAND*- AFFECTING SOLID WASTE MANAGEMENT

Annotated Code of Maryland

Title 4 - Water Management

Title 6 - Toxic, Carcinogenic, and Flammable Substances

Title 7 - Hazardous Materials and Substances

Under *Title 9 - Water, Ice and Sanitary Facilities*; MDE regulates the location, design, and operation of sanitary landfills through refuse disposal permits issued and enforced under authority of the following sections:

Section 204	*Installing, Altering, or Extending Water Supply Systems, Sewerage Systems, or Refuse Disposal Systems*
Section 204.1	*Installing, Altering, or Extending Incinerators*
Section 204.2	*Installing, Altering, or Extending Landfill Systems*
Section 209	*Landfill System Hearings*
Section 210	*Prerequisites for Issuance of Permit*
Section 211	*Landfills, Incinerators, and Transfer Stations; Requirements for Security*
Section 212	*Landfill Systems - Options to Purchase*
Section 212.1	*Denial of Permit to Non-government Person(s)*
Section 213	*Term of Permit (five years)*
Section 214	*Revoking or Refusal to Renew a Permit*
Section 215	*Closure and Cover when Operation Ends*
Section 225	*Landfills near Hospitals Prohibited (½-mile radius)*
Section 226	*Certification of Public Necessity Required for Hazardous Waste Landfill System*
Section 227	*Infectious Waste in Landfill System Prohibited*

Title 9, Subtitle 5, County Water and Sewerage Plans

Title 9, Subtitle 17, Office of Recycling

TABLE 1-6

SUMMARY OF MARYLAND REGULATIONS AFFECTING SOLID WASTE MANAGEMENT

COMAR REGULATIONS

Under *Title 8* (Department of Natural Resources), the following sections must be considered in the siting solid waste management facilities:

Subtitle 3, Chapter 8, Threatened and Endangered Species
Subtitle 9, Chapters 1-6, Forest Conservation

Title 26, Subtitle 3, Water Supply, Sewerage, Solid Waste, and Pollution Control Planning and Funding, Chapter 3, Development of County Comprehensive Solid Waste Management Plans:

Requires that each county maintain a current solid waste management plan and establishes the format for these plans.

Title 26, Subtitle 3, Chapter 10, Financial Assistance for the Construction of Processing and Disposal Facilities:

Stipulates the requirements, priority listing criteria, and ranking system for counties to receive financial assistance from the State of Maryland.

Title 26, Subtitle 4, Regulation of Water Supply, Sewerage Disposal and Solid Waste, Chapter 7 Solid Waste, Solid Waste Management:

Regulates permitting, designing, constructing, operating, and closing municipal, land-clearing debris, rubble, and industrial waste landfills, processing facilities, transfer stations, and incinerators.

Other regulations under *Title 26* that are important to solid waste management include:

Subtitle 4, Chapter 6, Sewage Sludge Management
Subtitle 4, Chapter 8, Scrap Tire Regulations
Subtitle 4, Chapter 9, Natural Wood Waste Recycling Facilities
Subtitle 8, Water Pollution
Subtitle 9, Chapter 1, Erosion and Sediment Control
Subtitle 9, Chapter 2, Stormwater Management
Subtitle 11, Air Quality
Subtitle 13, Disposal of Controlled Hazardous Substances
Subtitle 5, Chapter 3, Construction on Nontidal Waters and Flood plains
Subtitle 5, Chapter 4, Nontidal Wetlands
Subtitle 5, Chapter 7, Wetlands Regulations

All solid waste disposal and processing facilities are required to operate in a manner that reduces health hazards and minimizes environmental impacts. Discharges to water or air are limited to those permitted by solid waste disposal, water pollution control, or air pollution control regulations. The permitting process described in the following paragraphs is for a refuse disposal permit, which is a requirement for all solid waste management facilities. Additional permits are required for constructing and operating these facilities. These permitting requirements are included for use in planning and are not intended to provide a complete description of *COMAR* permitting requirements. An applicant for a permit must obtain a copy and strictly follow all requirements of the applicable *COMAR* regulations.

A. Municipal Landfills (*COMAR* 26.04.07.06-.08):

The permitting process for municipal landfills proceeds in three phases and requires that the public be notified of a proposed sanitary landfill. The siting of proposed solid waste acceptance facilities is accomplished and approved at the local or county level. Public notice is required for permit applications to construct, modify, or extend a landfill. The first phase of the permit application is a detailed site selection study and a site recommendation; once the landfill site is selected, a site-specific hydrogeologic study for the recommended landfill site is presented in the second phase and a conceptual design of the proposed sanitary landfill is presented in the third phase.

Section 9-210, Environment Article, Annotated Code of Maryland clarifies the local approvals required in the permitting process. The MDE may not issue a permit until the following steps are taken.

- MDE completes the preliminary review and sends its written findings to the County Commissioners and the Planning Commission.

- Charles County completes its review and provides MDE with a written statement that the proposed refuse disposal system: (a) meets all applicable county zoning and land use requirements; and (b) is in conformity with the *Charles County Comprehensive Solid Waste Management Plan*.

Public notification of applications for the construction of new landfills and the modification of existing landfills is required by Title 1 - Subtitle 6 - *Environment Article, Annotated Code of Maryland*. The regulation requires that the applicant publish notice of the application once a week for two weeks in a newspaper of general circulation within the County. In addition, the applicant must give notice by certified mail to land owners adjacent to the site, the chairman of the legislative body, and any elected executive of the County, the elected executive of any municipal corporation within the county, and any other county within one mile of the site. Should MDE receive a request to conduct a public information meeting, a meeting will be conducted prior to the approval of the first phase of the permit application. The applicant and interested parties will be invited to this meeting.

B. Land Clearing Debris Landfills (*COMAR* 26.04.07.11):

Land clearing landfills are restricted by COMAR regulation to accepting only those naturally occurring wastes that have been generated from land clearing operations. Construction and demolition waste is prohibited from this specific class of landfill. Information required for a permit is included in a single-phase permit application report. Prior to issuance of the refuse disposal permit, MDE will hold a public hearing for the debris landfill.

C. Rubble Landfills (*COMAR* 26.04.07.13-18):

The refuse disposal permitting process for a rubble landfill follows the three phase procedure used for municipal landfills. The MDE review procedure, and public participation requirements are also similar.

D. Nonhazardous Industrial Waste Landfills (*COMAR* 26.04.07.03, .19 and .20):

The permit application requirements for an industrial waste landfill are similar to those for a municipal landfill. A detailed waste characterization is required for industrial landfills. The information required for an industrial waste landfill is included in a single phase permit application report.

E. Processing Facilities (*COMAR* 26.04.07.23):

The refuse disposal permit application for a solid waste processing facility consists of a letter briefly describing the project followed by detailed engineering drawings and specifications.

Processes requiring unloading, separation, reduction, or alteration of solid waste must be performed within an enclosed building. Composting, white goods storage, and tire storage may be conducted outdoors. Composted materials for distribution must be non-pathogenic, biologically and chemically stable, and free of injurious components. A public hearing or notification is not required for processing facilities. These facilities may also require permits issued by the Air and Radiation Management Administration of the MDE.

F. Transfer Stations (*COMAR* 26.04.07.24):

Procedures and requirements for obtaining a transfer station refuse disposal permit are similar to those for processing facilities. Additionally, transfer station permitting requirements include information on procedures and methods for identifying and segregating unacceptable wastes. These facilities may also require permits issued by the Air and Radiation Management Administration of the MDE.

G. Incinerators (*COMAR* 26.04.07.25):

Procedures and requirements for obtaining an incinerator refuse disposal permit are similar to those for transfer stations. Additional requirements include location of storage areas for incinerator ash and other non-combustible products generated by the process, identification of a disposal site for the non-combustible materials, and a written operational plan for disposal of the waste in the event that the facility is non-operational. A public hearing will be held prior to the issuance of the permit.

These facilities may also require permits issued by the Air and Radiation Management Administration of the MDE.

1.5.2.2 Maryland Environmental Service

The Maryland Environmental Service (MES) is an agency within the Maryland Department of Natural Resources. MES has the authority to plan, acquire, construct, and operate water, wastewater, and solid waste facilities; institute and charge user fees; and create and administer funding authorities for issuing revenue bonds to provide project financing. MES is available to provide support to any locality which requests assistance. Additionally, MES will provide remedial services requested by MDE for a locality which has not complied with regulations. MES has been delegated the responsibility for overseeing Maryland's used oil and scrap tire recycling programs. MES currently operates waste oil and antifreeze collection stations and a tire stockpile facility in Charles County.

1.5.3 Charles County

Charles County regulates solid waste management activities through the *Code of Public Laws*, the administrative regulations adopted pursuant to the code, the *Charles County Zoning Ordinance*, and the resolutions adopted by the County Commissioners. Specific county regulations addressing solid waste management are described in the paragraphs below:

1.5.3.1 *Code of Public Laws of Charles County*

Section 132 of the Charles County *Code of Public Laws* enables the County to establish trash disposal areas and regulates the importation of solid waste into the County. Section 49 of the code requires that the County Commissioners establish trash disposal areas. It authorizes them to regulate the use of such disposal areas and to collect reasonable fees for their use.

1.5.3.2 County Commissioners of Charles County, Maryland Resolution No. 92-63. Regulations Governing the Use of Charles County's Sanitary Landfills

These regulations (Appendix B) were established and adopted by the County Commissioners on July 2, 1992 and are contained in Chapters 2 through 4, Article II of the Code of Charles County, Maryland.

The regulations specify the types of wastes that are and are not accepted, authorized users, permit requirements for commercial haulers, procedures for paying fees to use the landfill, and the penalty structure for bringing out-of-county waste into a county-owned sanitary landfill.

1.5.3.3 County Commissioners of Charles County, Maryland Resolution No. 92-75. Landfill Tipping Fees

These regulations establish the Charles County tipping fee at the Pisgah Landfill at $57 per ton commencing on October 15, 1992. Since the closure of the Pisgah Landfill, the tipping fee is applicable to the Charles County #2 landfill. Additionally, in emergency situations only, sludge may be disposed of in the landfill for the established municipal solid waste tipping fee.

1.5.3.4 Charles County Comprehensive Plan, September 1990 (Updated June, 1997)

The *Charles County Comprehensive Plan* provides a framework for establishing a long-range action plan for solid waste management. The document is a general guidance tool and is not intended to provide specific guidelines regarding solid waste management. Issues included in the comprehensive plan related to solid waste management are land use, general status report of solid waste management issues, policy considerations, and implementation strategies.

1.5.3.5 Charles County Zoning Ordinance, Maryland, October 1992

The *Charles County Zoning Ordinance* implements the planning policies and objectives presented in the *Charles County Comprehensive Plan*. The *Charles County Comprehensive Solid Waste Management Plan* serves as a policy guide as the Charles County Commissioners consider amendments to the *Charles County Zoning Ordinance*.

1.5.3.6 Charles County Chesapeake Bay Critical Area Management Program

This program identifies the extent of the Chesapeake Bay Critical Area within Charles County, and establishes detailed criteria to protect natural resources and regulate development within the critical area. The critical area is defined as those lands along tidal shorelines extending 1,000 feet landward of mean high tide or the landward boundary of tidal wetlands.

1.5.3.7 Zekiah Swamp Management Program

This program stresses the need for protection of the watershed from intense development and habitat degradation.

1.5.3.8 Patuxent River Policy Plan

Charles County, along with other counties neighboring the Patuxent River, are striving to protect river resources through land management strategies to control pollution in the watershed.

1.5.3.9 Charles County Floodplain Management Ordinance

This ordinance establishes and delineates a floodplain district within Charles County for issuance of permits and imposes certain regulations on construction and development within floodplain districts.

1.5.3.10 Charles County Recycling Plan, June 1990

The recycling plan fulfills the requirements of the 1988 Maryland Recycling Act, as confirmed by its approval by the MDE. This plan is the foundation of Charles County's recycling program and provides a comprehensive treatment of waste stream composition, markets, collection alternatives, processing alternatives, and implementation.

The *Charles County Recycling Plan*, which was adopted in 1990, was developed in close consultation with the Recycling Advisory Committee, and is the approved basis for meeting mandated recycling goals within the County. Per MDE requirements, the Charles County Recycling Plan has been incorporated into the Solid Waste Management Plan. The County has maintained a recycling rate of 30% and continues to expand the program.

1.5.3.11 Household Hazardous Waste

Household hazardous waste is collected nine (9) times a year on the first Saturday of the month, April through December, at the Charles County Sanitary Landfill in Waldorf. The County contracts with a hazardous waste handler to remove the materials from resident's vehicles on collection days, segregate the materials, pack and arrange for disposal of the materials. The materials are stored in a "90 day" facility on site and handled as if they were regulated waste under *COMAR* regulations. Shipments are made when there are full drums of material; the building is completely emptied after the December collection. Examples of these wastes would be gasoline, herbicides, pesticides, household cleaners and paints. Latex paint is bulked up into five (5) gallon buckets and given away to non-profit organizations. Charles County has also assisted St. Mary's County in two (2) collection events and provided resources to Calvert County to develop a program.

1.5.4 Incorporated Towns and Federal Facilities

The *Annotated Code of Maryland* and the *COMAR* address the potential for incorporation of subsidiary solid waste plans developed by individual municipalities into the *Charles County Comprehensive Solid Waste Management Plan*. If the Charles County Commissioners determine that incorporation of a subsidiary plan meets the environmental protection goals of the *Charles County Comprehensive Solid Waste Management Plan*, it can be incorporated by reference. The specific citations from the codes are as follows:

- *Annotated Code of Maryland, Title 9-504* - "(a) Required incorporation. - To the extent that the incorporation will promote the public health, safety, and welfare, each county plan shall incorporate all or part of the subsidiary plans of each town, municipal corporation, sanitary

district, privately owned facility, or local state, or federal agency that has existing or planned development in that county."

- *COMAR* 26.03.02.B - "Each county plan shall include all or part of the subsidiary plans of the towns, municipal corporations, sanitary districts, privately owned facilities, and local, state and federal agencies having existing, planned or programmed development within the county to the extent that these inclusions shall promote the public health, safety, and welfare. These subsidiary plans may be incorporated by reference into the county plan."

As stated above, COMAR provides Maryland municipalities the option to develop their own, or portions of their own solid waste plan and have it incorporated into the *Charles County Comprehensive Solid Waste Management Plan*. Charles County developed a cooperative working relationship with the municipalities of Indian Head, La Plata and Port Tobacco to provide for a solid waste management program which benefits the entire county. The special needs and requirements of the municipalities as are reflected in the *Charles County Comprehensive Solid Waste Management Plan*. The incorporated towns of Charles County follow the solid waste management program as detailed within this Plan.

1.6 PLAN AMENDMENT PROCEDURE

Amendments to the *Charles County Comprehensive Solid Waste Management Plan* will be required for the establishment of new solid waste facilities, and for revisions or updates to the plan. Amendments to the Plan may occur at any time and may originate from within the Charles County government or from the general public.

The process for amending this Plan is guided by the Charles County Department of Planning and Growth Management to meet the requirements stipulated by *COMAR* 26.03.03.05 for revising the Plan. The amendment process includes a public information meeting and a public hearing before the Charles County Commissioners. Table 1-7 lists the general requirements and process for amending the *Charles County Comprehensive Solid Waste Management Plan.*

This amendment procedure is not intended to provide specific information such as the level of detail in the amendment request, criteria for approval, and types of facilities, which require amendments. The intent is to provide decision-makers with a framework for the amendment procedure. The County recognizes that the specifics for the amendment procedure will need to be developed to ensure the consistency of the amendment procedure.

TABLE 1-7

REQUIREMENTS AND PROCESS FOR SOLID WASTE MANAGEMENT PLAN AMENDMENTS

GENERAL REQUIREMENTS

- Required for the establishment of new solid waste management facilities/processes, and for revisions to the solid waste management plan's goals, objectives, policies, or action plan and supporting sections related to the amendments.
- Amendments may originate from within Charles County Government or from the general public.
- Consideration of amendments may occur at any time.
- An amendment proposal shall contain a description of the proposed amendment, justification statement, and supporting information as necessary. The County may establish technical criteria or standards for the evaluation of amendments. The County may reject proposed amendments that are incomplete or technically inadequate.
- The amendment process shall meet the plan revision requirements of *COMAR* 26.04.03.05.

AMENDMENT PROCESS

1. Amendment submitted to or prepared by the Charles County Planning Division.
2. Staff recommendation developed prior to public hearing.
3. Legal notice and press release issued for public hearing on the amendment at least two weeks prior to the hearing.
4. Hold a public hearing before the Charles County Commissioners.
5. Commissioners action on the amendment.
6. Adopted amendment forwarded to the MDE for approval.

Note: The special exception process substitutes for this process when applicable, although a Commissioners' resolution to amend the Charles County Comprehensive Solid Waste Management Plan will be necessary to incorporate a solid waste facility/process approved by special exception into the Charles County Comprehensive Solid Waste Management Plan.

CHAPTER 2

COUNTY BACKGROUND INFORMATION

2.1 CHAPTER SUMMARY

Chapter 2 presents background information, including general historical and geographical information, on Charles County. Current and projected population, used to develop waste generation projections in Chapter 3, is presented in this chapter. A discussion of the solid waste management practices, policies, and intergovernmental and private sector agreements regarding municipalities and federal facilities within the County is also included. The status of zoning requirements and the *Charles County Comprehensive Plan* is also discussed.

2.2 BACKGROUND

2.2.1 Location and Setting

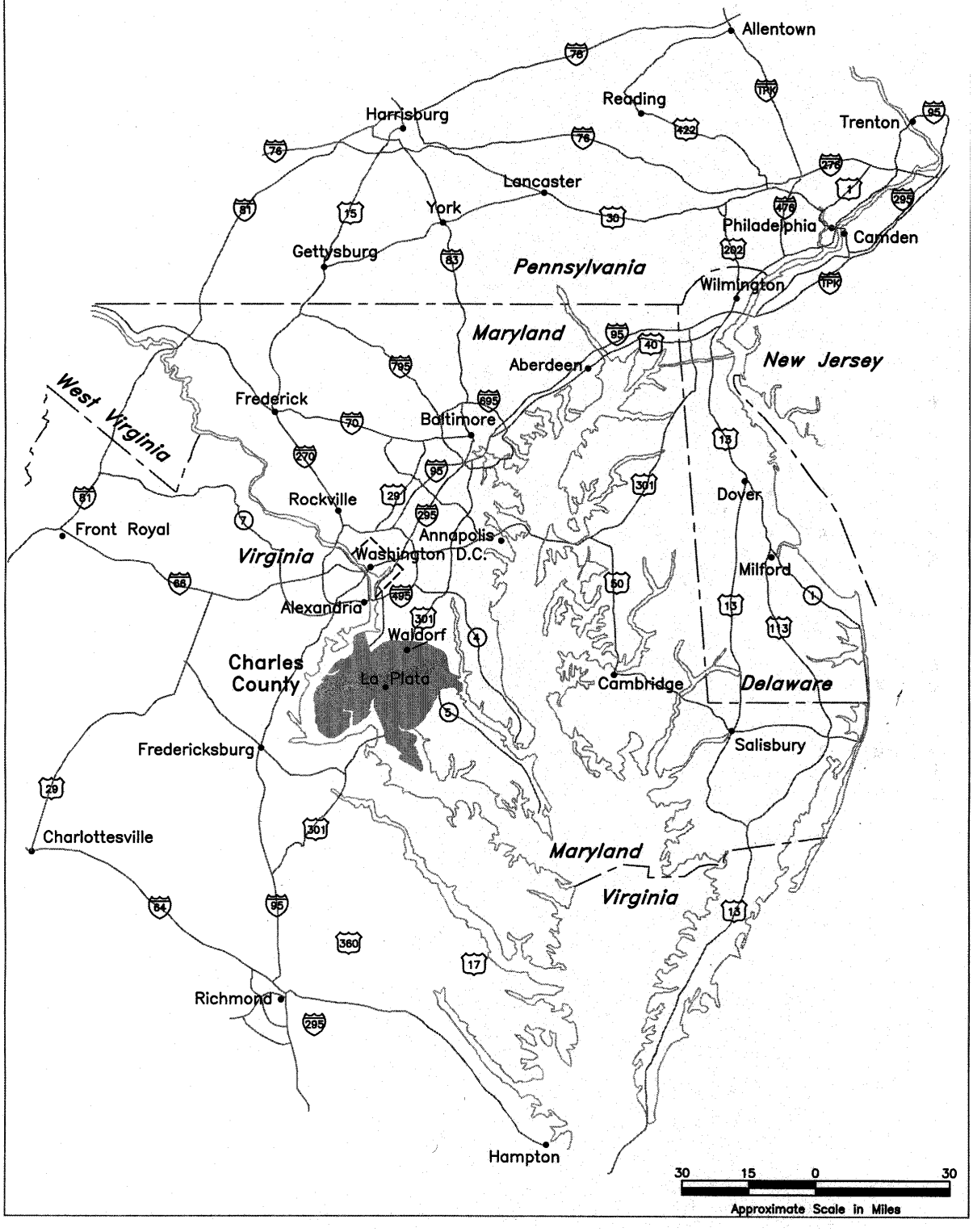
Charles County is a rapidly developing area located about 30 miles south of the Washington, D.C. Metropolitan Area. Over the years, Charles County has been able to remain as a diversified community with extensive waterfront, unique environmental resources, agriculture, woodlands, a rich historical heritage, and urbanized areas.

Charles County is located in southern Maryland, bordered by Prince George's County to the north and Calvert and St. Mary's Counties to the east. The County is bordered by the Potomac and Wicomico Rivers to the south, and the Patuxent River to the east (Figure 2-1).

Most of the land area in Charles County contains elevations ranging from 0 to 230 feet above sea level and is drained by tributaries of the Potomac River. The County is part of the Atlantic Coastal Plain, which forms the western shore of the Chesapeake Bay Region. Charles County is 458 square miles (293,120 acres) in area, with 183 miles of shoreline primarily on the Potomac River.

Growth and economic development is strongly influenced by the Baltimore and Washington highway corridors. Military installations, agriculture, and seafood harvesting industries also contribute to the local economy. As the County continues to urbanize, increasingly built-up areas are concentrating along the major highways (U.S. Route 301 and Maryland Routes 228 and 210). Links with other cities in the Washington, D.C. suburban area and beyond are facilitated by Interstates 495 and 95, Maryland Routes 3, and 4, and US Route 50, as well as points south via the Potomac River Bridge.

Figure 2–1
Charles County, Maryland
Vicinity Map



2.2.2 History

Founded in 1658, Charles County is steeped in the traditions of Southern Maryland and retains many of the tobacco customs dating back three centuries. It is Maryland's fifth oldest county and is unique among the old counties in that it has all of its official records. Until 1895 the county seat was Port Tobacco, which also served as the business and cultural center of Maryland in colonial days. By 1890, Port Tobacco was losing its eminence as a port due to the silting of the river and the resulting impacts on the sailing vessels. The burning of the Port Tobacco courthouse in 1892 added to this loss of eminence and, in 1895, the county seat was relocated to La Plata.

Charles County was one of Maryland's least known counties until 1940 when the Potomac River Bridge was constructed. The opening of the bridge created an important north/south travel corridor on U.S. Route 301. Since 1950, population, housing and commerce have all expanded greatly due in part to the proximity to the Washington metropolitan area. The County is now a mixture of suburban development in the north-central and northwest sections of the County, interspersed with older rural and semi-rural development patterns elsewhere in the County.

2.2.3 Natural Characteristics and Resources

2.2.3.1 Geography

Charles County has a land area of about 458 square miles, seventh in size among Maryland's 23 counties. The County measures approximately 29 miles from north to south and 32 miles from east to west. It is bounded by the Potomac River on the west and south; by Prince George's County on the north; and by St. Mary's County on the southeast. Elevations vary from sea level along the Potomac River to 230 feet near Waldorf. The Washington Beltway (I-495) is only 15 miles from Waldorf, affording access to Washington, Baltimore, and other points on the eastern seaboard.

2.2.3.2 Drainage Basins

All streams and water bodies in Charles County empty into the Potomac or Patuxent Rivers, and ultimately the Chesapeake Bay. Major water bodies within the County include the Wicomico River, Zekiah Swamp, Gilbert Swamp, Port Tobacco River, Nanjemoy Creek, Mattawoman Creek, and the Pomonkey Creek. The eastern half of the County is drained by the Zekiah Swamp and its tributaries, including the Gilbert and Jordan Swamp Runs. The northern portion of the County is drained by the Mattawoman and Pomonkey Creeks. The central and southwestern portions of the County are drained by the Port Tobacco River, Nanjemoy Creek, Wards Run, and Mill Run.

2.2.3.3 Water Resources

Although Charles County is bordered by both the Patuxent and Potomac Rivers, their use as surface water supply sources is constrained because of their salinity concentrations. The County also has a large number of smaller rivers and streams which are not capable of any large-scale water supply. There are presently three lakes in Charles County with a surface water area of about 12 square miles.

Five major water-bearing formations, or aquifers, are found beneath Charles County, sloping from west to east. They are found in the Patuxent, Patapsco, Raritan, and Magothy formations of the Cretaceous system, and the Aqua Greenstone of the Eocene series. The major water supply sources are the Magothy, Patapsco and Patuxent aquifers. These aquifers are found at depths ranging from 300 to 1,000 feet below the ground elevations. Groundwater provides the vast majority of the drinking water in Charles County. In a few places, it is available from springs, but in most locations water is drawn from wells.

2.2.3.4 Topography

Located in the Atlantic Coastal Plain, Charles County is a relatively low-lying area. Elevations range from 10 feet above sea level near the Potomac River to approximately 230 feet near Waldorf. Large portions of the County are exceedingly flat, with a gentle slope toward the Chesapeake Bay, or toward local drainage features. Broad plateau formations with sides dissected by drainage features are common throughout most of the County. The dissections show the easily eroded clays, sands, and gravels underlaying the plateaus. In some areas, dissection is incomplete and flat areas, several miles across, have not yet been reached by headward cutting streams. Stream valleys affect local topography throughout the County.

Adjacent to the Potomac and Patuxent rivers are low-lying flats not more than 10 to 25 feet above sea level. Steeply-sided terrace formations are often present in these locations as well. These flats vary in width from a few feet, where the river current of the Potomac River washes strongly against the shoreline (e.g., northern areas near Indian Head and Potomac Heights), to more than a mile in the southern part of the County, such as Allen's Fresh. The interior of the County, along U.S. Route 301 from Faulkner (VA) to Prince George's County, is predominately flat. Outward from this plateau, dissection becomes more pronounced and the land is gently rolling and hilly.

2.2.3.5 Geology and Soils

The geologic formations beneath Charles County are composed of gravel, sand, silt, and clay. These materials were transported by streams, particularly the Potomac River, from the Appalachian and Piedmont regions west and north of the County and were deposited in the form of alluvial fans and deltas. Tidal and marine muds and silt layers overlay dense, hard crystalline, metamorphic, and igneous rocks of the Precambrian Age. The crystalline rocks are deep below the surface. Diatomaceous deposits are unique to this part of Maryland and are found throughout the County.

In the vicinity of Faulkner County, VA are unique surficial sediments which are a relatively young, thin veneer, approximately 30 feet in thickness, occupying elevations of 30 feet above mean sea level and consisting of gravel, sand, and silt. These sediments were deposited by the eastward flowing Potomac River as the river migrated slowly southeastward to its present location. Beneath this granular deposit is the Calvert formation of the Chesapeake Group, which is composed of the Fairhaven and Plum Point Marls. This formation overlies and tends to seal the surficial granular deposit from the older geologic units.

2.2.3.6 Minerals

There are abundant mineral resources throughout Charles County which are found as alluvial deposits, chiefly in the form of construction-grade sand and bank-run gravel found just below ground surface. These minerals are used by the construction industry as aggregate material. Sand and gravel mining operations and processing facilities are found throughout the County. Clay and diatomaceous earth deposits are also prevalent in the Coastal Plain Province, but have limited distribution in Charles County. These clays and diatomaceous earth deposits are not currently mined in significant quantities. Mining of these materials may accelerate if market conditions change.

2.2.3.7 Climate

Charles County has a temperate climate, affected to some degree by the water masses of the Potomac and Chesapeake Bay. Situated in the mid-Atlantic, the County has four well-defined seasons. The frost-free growing season typically occurs between April 20 to October 20. The coldest temperatures usually are in late January and early February. Snowfall may occur from November to April. The warmest temperatures usually occur in late July and early August. Mean temperatures (Fahrenheit) are 74.1 degrees in the summer and 36.3 degrees in the winter. The prevailing wind pattern is from the northwest during October to April and from the south and southwest from May to September. Annual precipitation averages 42.6 inches.

2.3 POPULATION AND EMPLOYMENT

2.3.1 Regional Setting and Growth Trends

Population distribution reflects the influence of the proximity to Washington, D.C. and the influences of local employment. The County's development district encompasses the northwest quadrant of the County from Waldorf to Indian Head, where the most densely populated areas of the county are located. Since 1990, the County has been achieving the Comprehensive Plan goal of directing 75 percent of new growth in the development district. Other populations centers include the election districts of Pomonkey, La Plata, and Bryantown.

According to the 1990 Census, Charles County had a population of 101,154. The 1990 population was approximately 39 percent above the 1980 population of 72,751, making Charles County the third fastest-growing county in Maryland during this period. The latest figures released by the Census Bureau indicated that comparative growth has slowed somewhat, with the County's estimated population of 115,075 (July 1, 1997) placing it as the eighth fastest growing county in Maryland. As of September 30, 1998, the estimated population of Charles County is 120,420.

The Metropolitan Washington Council of Governments considers Charles County among the outer suburbs (outside 20 mile radius of Washington, D.C.) which will be influenced by the metro area. The outer suburbs are forecasted to experience a 118 percent increase in employment during the period 1990 to 2020. Employment in Charles County is responding to the increase in residential

growth with an increase in retail and commercial services. Industrial and manufacturing sectors generally respond to economic factors rather than residential growth.

In 1997, the largest sectors of employment were trade (retail and wholesale) at 29.68 percent, services (27.72 percent), government (17.57 percent) and construction (10.42 percent). The largest single employer in Charles County is the Naval Surface Warfare Center at Indian Head. During the more recent period from 1990 to 1995, wholesale trade, construction and manufacturing sector employment decreased.

2.3.2 Population And Employment Projections

Population projections for the County were developed using projections for housing units and the average number of persons per housing unit which were developed by the Charles County Planning Department. The data used to develop the population projections is provided in Appendix C. Charles County population and employment projections for the years 1990 through 2020 are provided in Table 2-1. These projections indicate that the population will increase by approximately 48 percent between the years 1990 and 2010 to a population of 149,756; employment in Charles County is projected to increase by approximately 45 percent from 1990 to 2010 to 57,300.

2.3.3 Effect of Growth on the Provision of Solid Waste Management Services

New development activity within Charles County is primarily located in the Development District and along the U.S. Route 301 corridor. The Development District includes the areas of Waldorf, St. Charles, Bryans Road, Indian Head and White Plains.

Increased residential growth provides for increased building and construction waste (rubble) and increased waste from the commercial sectors of the community. Building and construction waste as well as land-clearing waste comprises a large portion of the waste generated in the County and is making an additional demand on existing landfill capacity. The disposal of rubble and land-clearing debris in the County landfill is costly and significantly reduces available landfill capacity.
Charles County considers the combined effort of recycling and disposing of rubble and land-clearing debris in designated landfills an excellent opportunity to significantly extend the life of the sanitary landfill.

Charles County officials realize that the planning of growth is critical to the provision of efficient and cost-effective solid waste management services. The presence of existing development, infrastructure, and transportation reduce the cost and maximize the efficiency of solid waste and recyclable collection services. Controlled growth within development districts would minimize collection costs and increase the opportunity for modifying collection practices to meet the goals and objectives of this plan. Wide-spread growth, resulting in sparsely populated areas, would increase collection costs, increase vagrant dumping to avoid collection fees or trips to the landfill, and minimize the opportunity for modifying collection practices.

The primary growth management and land use concept developed in the *Charles County Comprehensive Plan* is that of the establishment of the "development district" generally located in northwestern Charles County. The development district is intended to serve as the principal center for population growth, services, and employment. Comprising the most suitable area for new population growth, by virtue of existing development, infrastructure, and transportation networks, this area is planned to receive 75 percent of the County's growth through the year 2020.

TABLE 2-1

POPULATION AND EMPLOYMENT PROJECTIONS

Year	Housing Units [1]	Population [2]	Employment [3]
1990	34,487	101,154	39,400
1995	38,941	111,600	45,900
2000	43,818	122,852	54,100
2010	55,632	149,756	57,300
2020	70,432	182,552	60,500

[1] 1997 Charles County Comprehensive Plan
[2] 1997 Charles County Comprehensive Plan
[3] Maryland Office of Planning, 1998 Projections

2.4 INCORPORATED TOWNS

There are three incorporated towns within Charles County: the Town of Indian Head, the Town of La Plata, and the Town of Port Tobacco. The locations of the three incorporated towns are shown in *yellow* in Figure 2-2.

The estimated 1999 population for the Town of Indian Head is 4,044 , the Town of La Plata is 7,500, and there are approximately 50 people in the Town of Port Tobacco. Due to its small size, the smallest incorporated town in the State, the Town of Port Tobacco is generally discussed as part of Charles County rather than as an incorporated town. The Town of La Plata serves as the center of the Charles County government's administrative and institutional services.

2.5 FEDERAL FACILITIES

Federal facilities in Charles County include the U.S. Naval Surface Warfare Center and Naval Explosive Disposal Facility in Indian Head and the Blossom Point Proving Grounds. In addition, there are two properties owned by the National Parks Service in Charles County: the Thomas Stone Historical Site and the Piscataway National Park. The locations of these federal facilities are also shown in Figure 2-2.

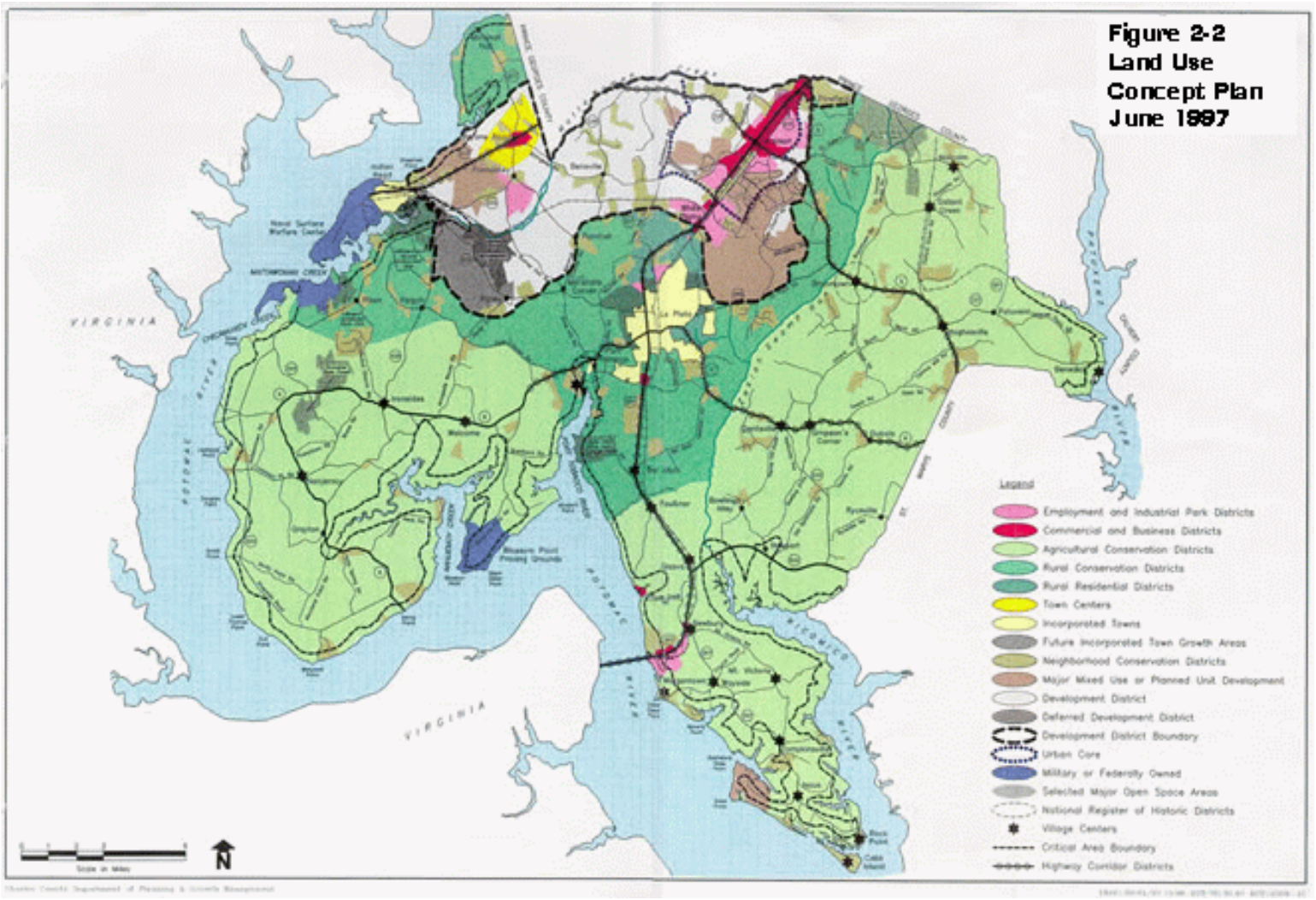


Figure 2-2
Land Use
Concept Plan
June 1997
VIRGINIA
VIRGINIA
Legend
Employment and Industrial Park Districts
Commercial and Business Districts
Agricultural Conservation Districts
Rural Conservation Districts
Rural Residential Districts
Town Centers
Incorporated Towns
Future Incorporated Town Growth Areas
Neighborhood Conservation Districts
Major Mixed Use or Planned Unit Development
Development District
Deferred Development District
Development District Boundary
Urban Core
Military or Federally Owned
Selected Major Open Space Areas
National Register of Historic Districts
Village Centers
Critical Area Boundary
Highway Corridor Districts
N

2.6 COMPREHENSIVE LAND USE POLICIES

The County Commissioners adopted the *Charles County Comprehensive Plan* on June 23, 1997. The Plan is the result of a joint effort of elected and appointed officials, professional land use planners, and a 30-member Citizens Advisory Committee. The Plan presents policies and guidelines to serve the County for the duration of the 20-year planning horizon.

The *Charles County Comprehensive Plan* consists of a land use map (Figure 2-2), goals, objectives, policies, and recommendations that will guide future land development. Other elements of the Charles County overall comprehensive planning program include: documents prepared to complete the comprehensive plan (e.g., *Charles County Critical* Area Program, and *Charles County Land Preservation and Recreation Plan*); documents which will serve to implement the comprehensive plan (e.g., *Zoning Ordinance*, *Subdivision Regulations*); and documents which influence the comprehensive plan (e.g., *Comprehensive Sewer and Water Plan, Capital Programming, Comprehensive Plan for Schools, Charles County Comprehensive Solid Waste Management Plan, Public Safety Plan, Emergency Operations Plan,* and *Fire and Rescue Plan*). The *Charles County Comprehensive Solid Waste Management Plan* coordinates the siting and operation of solid waste management facilities with the land use goals, objectives, and policies of the *Charles County Comprehensive Plan*.

Topics discussed in the *Charles County Comprehensive Plan* include the following:

- Growth Management and Land Use
- Economic Development
- Community Facilities and Services
- Housing
- Agricultural and Forestry
- Community Development
- Transportation
- Natural Resource Protection
- Historic/Cultural Preservation
- Implementation

In relation to solid waste management, the comprehensive plan presents goals, policies, and implementation strategies for many public services, including the management of solid wastes.

2.7 ZONING REQUIREMENTS

The *Charles County Zoning Ordinance* was adopted by the County Commissioners in August 1992. The zoning ordinance is designed to implement the comprehensive plan. The *Charles County Zoning Ordinance* presents one conservation zone, two rural zones, two village zones, four residential zones, four commercial zones, two industrial zones, one planned unit development zone, one waterfront planned community, four planned development zones, and three overlay zones. A brief description of each zone is provided below.

- The Agricultural Conservation zone (AC) provides a full range of agricultural and farming activities, protects these established uses from encroaching development which may adversely affect the agricultural economy of the County, and encourages the right to farm in the County without undue burden on the landowner.

- The Rural Conservation (RC) and Rural Residential (RR) zones are intended to maintain rural character in the County areas consistent with the *Charles County Comprehensive Plan* objectives.

- The Village Residential (RV) and Village Commercial (CV) zones are located at existing centers of population or commerce in areas of the County outside the development district.

- The Low-density suburban Residential (RL), Medium-density suburban Residential (RM), High-density Residential (RH), and Residential Office (RO), concentrate residential development in areas identified as development districts in the *Charles County Comprehensive Plan*.

- Neighborhood Commercial (CN) and Community Commercial (CC) zones provide standards for the range of commercial uses from neighborhood business to highway-oriented commercial uses. The Central Business (CB) zone provides appropriate locations for high intensity commercial uses and encourages development consistent with a traditional "downtown" area. The Business Park (BP) zone concentrates business and light industrial uses in a park-like setting to promote economic development and job creation while protecting the environment and reducing impacts on the surrounding residential neighborhoods.

- General Industrial (IG) and the Heavy Industrial (IH) zones strengthen the economic environment of the County by recognizing existing industrial uses and promoting industrial development in order to broaden the County's tax base and create new jobs.

- The Planned Unit Development (PUD) zone is designated for St. Charles. Activity within this zone is bound by the requirements of Docket 90 and all other legally binding agreements executed between the County and the developer.

- Swan Point is designated as a Waterfront Planned Community (WPC). The activities within this zone are bound by Docket 250. No additional waterfront planned community zones will be considered.

- Planned Residential Development (PRD), Mixed-use Development (MX), Planned Employment Park (PEP), and Planned Manufactured Home Park (PMH) zones encourage innovative and creative design of residential, commercial, and industrial development, and provide a broad range of housing and economic opportunities to residents of the County consistent with the *Charles County Comprehensive Plan*.

- The Intense Development (IDZ), Limited Development (LDZ), and the Resource Conservation (RCZ) overlay zones provide special regulatory protection for the land and water resources located within the Chesapeake Bay Critical Area in Charles County. These zones implement the Charles County Critical Area Program, the Maryland Critical Area Law, and the Critical Area Criteria.

The purpose of the *Charles County Zoning Ordinance* is to regulate land uses in order to protect and promote the health, safety, morals, comfort, and welfare of the present and future inhabitants of Charles County. Zoning requirements implement the land use objectives of the *1997 Charles County Comprehensive Plan*. The solid waste management plan is an important component of the *Charles County Comprehensive Plan.* and zoning requirements for solid waste management facilities and activities should support the above requirements.

CHAPTER 3

EXISTING SOLID WASTE MANAGEMENT

3.1 CHAPTER SUMMARY

Chapter 3 compiles a database on existing solid waste management facilities and programs. Historic volumes of solid waste and recovered recyclables are used to project solid waste generation for the 10-year planning period. The descriptions of the existing collection system, disposal facilities, and recycling program provide the basis for the evaluation and needs assessment of subsequent chapters.

3.2 GENERAL

A realistic and accurate analysis of the Charles County waste stream is essential for developing and implementing an integrated solid waste management program in Charles County. This analysis addresses the quantity, composition, and characteristics of the solid waste stream including recovered recyclables.

The quantity and types of solid waste and recyclables produced in the County affects planning in the following three ways.

- The sizing and design for proposed solid waste management facilities.
- The relative location and size of waste generation centroids which affect the location of facilities, and may result in the need for regional sub-systems.
- The financial planning and management of proposed facilities.

It is difficult to obtain an accurate determination of the quantities and types of waste produced within the County for the following reasons.

- Since some residents collect and dispose of their own waste, it is difficult to determine how much waste is burned, disposed of on-site, recycled, or otherwise improperly disposed of in the County.
- Since the majority of waste is collected by private haulers, it is difficult to define service areas represented by the data and to identify the waste types.
- Comparison with other, similar counties is difficult as many counties have limited accurate and reliable historical weight and analytical data for their solid waste stream composition.

Based on these limitations, the most direct and accurate method of obtaining information on the quantities and types of solid waste and recyclables is through the interpretation of County records.

Estimates of solid waste stream composition are determined using all available information and incorporating data collected since the opening of the Charles County Sanitary Landfill #2.

3.3 HISTORIC WASTE DISPOSAL AT PISGAH LANDFILL

Until it's closure in July 1994, the Pisgah Landfill was the only landfill in Charles County accepting non-hazardous solid waste generated in the County; therefore, disposal records from the facility are used in combination with the Charles County Sanitary Landfill records to forecast solid waste generation and for estimating the source, type, and composition of accepted waste materials.

There are two sources of records for the waste disposed at the Pisgah landfill. The Department of Fiscal Services provides an annual (fiscal year) summary for the waste haulers and the amount of waste delivered to the landfill. The second source, the Division of Solid Waste, provides an annual (calendar year) summary for the amount of waste delivered to the landfill. Although the records from the Division of Solid Waste are only available since 1991, county landfill personnel indicated that these records provide a more accurate estimate for the volume of waste disposed at the landfill. Fiscal year records for the landfill have been maintained since 1979; however, these records are used primarily for financial purposes and the waste volumes may include soil used for cover material.

The estimated quantities and characteristics of the waste disposed at the Pisgah Landfill until June 1994, and the Charles County Sanitary Landfill from July 1994 to present are described in the following sections.

3.3.1 Waste Quantities

Waste quantities have dropped significantly in recent years as a direct result of the 1994 Supreme Court ruling commonly known as the "Carbone Decision". This landmark decision stated that refuse was in fact a commodity, and therefore, subject to laws of the Interstate Commerce Commission. The result was that local jurisdictions could not pass any laws directing the flow of waste to a particular waste acceptance facility. Until this decision, it was common practice for local governments to do so to insure a revenue source for landfills or waste to energy incinerators, particularly in the more densely populated East Coast states.

Almost immediately the impact was felt in Charles County when a number of large landfills were opened up in Southern Pennsylvania and Central Virginia with disposal rates much less ($15-$30) than Charles County ($57.00). At the same time a number of private transfer stations opened in neighboring Prince George's County and the District of Columbia which allowed the local haulers to take advantage of dumping at a discounted rate ($35-$45) without driving to Pennsylvania or Virginia. The situation was even more critical in Charles County when one national hauler, Waste Management Inc., controlled 50 percent of the market and owned a transfer station in D.C. and a mega-fill in Pennsylvania. Their decision to utilize these facilities resulted in an overnight decrease of trash by 50 percent. In 1997, a large landfill opened in King George County which is the neighboring county across the Potomac River Bridge, approximately 30 miles south. The new King George County Landfill attracted several small haulers. The results of these changes can be seen in Table 3-1.

TABLE 3-1

WASTE LAND FILLED
Fiscal Years 1979-1999

Year	Fiscal Year		Calendar Year	
	Waste (Tons) (a)	Average Monthly (Tons)	Average Monthly (Tons) (b)	Waste (Tons) (c)
1979	42,255	3,521		
1980	45,803	3,817	3,669	44,029
1981	52,978	4,415	4,116	49,391
1982	58,856	4,905	4,660	55,917
1983	68,853	5,738	5,321	63,855
1984	60,001	5,000	5,369	64,427
1985	72,358	6,030	5,515	66,180
1986	77,846	6,487	6,259	75,102
1987	90,722	7,560	7,024	84,284
1988	94,620	7,885	7,723	92,671
1989	100,222	8,352	8,118	97,421
1990	109,838	9,153	8,753	105,030
1991	99,038	8,253	7,923	95,080
1992	88,132	7,344	6,762	81,139
1993	78,419	6,535	6,081	72,970
1994 (e)	77,658	6,472	7,799	69,106
1995	65,702	5,475	10,230	122,760
1996	50,162	4,180	10,529	126,342
1997	45,300	3,775	7,298	87,571
1998	39,969	3,331	8,612	82,485
1999	36,280	3,023	6,166	73,992

(a) Fiscal year waste volume from Charles County Department of Fiscal Services.

(b) Interpolated from fiscal year data.

(c) Calculated from average monthly data.

(d) Based on Calendar year waste volumes from the Charles County Department of Solid Waste.

(e) Based on accepted solid waste volumes from July 31, 1994 through December 1994 (Charles County Sanitary Landfill opened July 1 1994).

Currently, the annual flow of waste has stabilized to approximately 50,000 tons, which is 60 percent of historical volumes. At the current rate of flow and the current disposal fee of $57.00, the landfill remains solvent at a break-even point due to a restructuring of finances. Since the outstanding debt for landfill construction was minimal as the majority of the landfill was financed with "pay-go money," the decrease of revenue has a profound positive effect. Finding the right balance for saving the proper capital was accomplished by reviewing the current rate of fill, available air space, compaction rate and corresponding revenue. This formula can be adjusted by changing any of the variables and computing through a software program developed by the Charles County Fiscal Services Department.

3.3.2 Waste Characteristics

Prior to 1989, the Charles County Department of Fiscal Services retained Landfill records for the purposes of financial accounting. These records do not contain adequate information on the breakdown of waste types and quantities. The *1990 Charles County Recycling Plan* provided an analysis of the 1989 fiscal year landfill records including the source (i.e., residential or commercial), type (i.e., rubble or municipal), and composition (e.g., plastic, paper, etc.) of the municipal solid waste generated in Charles County. Since 1989, Charles County has kept accurate records of the source, composition, and type of solid waste accepted at the County Landfill.

3.3.2.1 Hauler Designations

The financial records classify the waste delivered to the landfill based on the hauler designation. However, the hauler designations are not synonymous with the source (e.g., residential or commercial/industrial) or type (e.g., rubble or non-rubble) of waste delivered to the landfill. Prior to the ban for landfilling sludge, all of the hauler designations were approved to transport sludge.

Hauler designations include the following categories which are described below:

- Commercial Garbage/Solid Waste (G/SW) Haulers
- Municipal Haulers
- Non-commercial Haulers
- Private Haulers
- Building Rubble Haulers

A. Commercial Garbage/Solid Waste (G/SW) Haulers

Commercial G/SW is waste that is delivered by commercial (private) haulers, permitted by the Charles County Health Department to haul waste generated by households, businesses, and

restaurants. Commercial G/SW may include solid waste, tires, and rubble; however, the landfill records do not provide a reliable means to classify or quantify the waste types.

B. Municipal Haulers

Waste generated within the municipalities of La Plata and Indian Head is brought to the landfill by haulers designated as "municipal waste haulers". Waste generated by households, commercial establishments, and institutional services within the municipalities are collected by municipal waste haulers. Waste types delivered to the landfill by municipal waste haulers may include solid waste, tires, and rubble; however, the landfill records do not provide a reliable means to classify or quantify the waste types. Prior to the ban for landfilling sludge, sludge was also delivered by this hauler designation.

C. Non-commercial Haulers

The non-commercial waste designation includes waste delivered to the landfill by county, state and federal departments (e.g., state highway, county maintenance, etc.); institutions; individuals who deliver their waste to the landfill; community clean-ups which are generally bulky waste; and tires. Non-commercial waste haulers collect residential and institutional waste. Although a significant portion of the waste delivered by non-commercial haulers is rubble, landfill records identify only a small percentage of the rubble. Prior to the ban for landfilling sludge, sludge was also delivered by this hauler designation.

D. Private Haulers Without Permits

Haulers who deliver commercially generated rubble to the landfill without a building rubble permit are included in this designation. The haulers are allowed to dispose of only one load without a permit; subsequent loads from the same hauler must be permitted. Private haulers without permits generally haul rubble and tires.

E. Building Rubble Haulers

The building rubble designation includes commercial and institutionally-generated rubble and tires. Prior to the ban for landfilling sludge, sludge was also delivered by this hauler designation.

3.3.2.2 Waste Source and Type

During fiscal year 1989, the non-rubble categories of waste (i.e., residential, commercial/industrial, and institutional) comprised 92.9 percent of the waste delivered to the landfill. Based on the landfill records, only 7.1 percent of the waste delivered to the landfill was rubble. A survey, conducted by landfill personnel during the summer of 1991, concluded that approximately 25 percent of the waste land filled is rubble. This survey confirmed that a significant portion of rubble waste was categorized as residential, commercial/industrial, and institutional waste. Since the County has a self imposed ban on homogenous loads of rubble from commercial generators and haulers, and the tipping fee for

such is relatively cost prohibitive, the actual amount of rubble is estimated to be approximately 4,000 tons per year.

3.3.2.3 Municipal Waste Composition

Previous analyses of the Charles County municipal (residential and commercial/industrial) waste stream composition were taken from the *Charles County Recycling Plan*. The analysis, performed by Gershman, Brickner, & Bratton, Inc. (GBB), used waste composition studies for similar counties to approximate the composition of waste generated in Charles County. Currently, the County estimates waste stream composition through monthly reports of waste received at the landfill and recycling centers throughout the County. The estimated municipal waste composition at the Charles County Sanitary Landfill is shown in Table 3-2.

3.3.2.4 Rubble Composition

Composition of the rubble waste stream has not been well documented and may vary significantly with location, season, and economy. A study conducted in Clearwater, Florida determined the following composition (by weight) for rubble accepted at the recently established recycling facility.

- Wood - 32 Percent
- Paper - 18 Percent
- Metal - 7 Percent
- Plastic - 2 Percent
- Other - 23 Percent
- Roofing - 13 Percent
- Concrete - 3 Percent
- Earth Materials - 2 Percent

The above data may not reflect the exact composition of the Charles County rubble waste, but could serve as an approximation for preliminary consideration and discussion of the possible rubble processing requirements.

3.4 HISTORIC RECYCLING QUANTITIES

Prior to July 1991, records for the recycling program did not include commercial recycling. Approximately 722 tons of residential recyclables were recovered from the Charles County waste stream through the Recycling Action for Charles County Community Voluntary Recycling Program from October 1989 through June 1992. Since July 1991, the County's implemented recycling program includes recycling records for the commercial recycling effort. For the calender years 1994 through 1997, Charles County recycled 98,196 tons of material, 54,493 tons (55%) commercial and 43,703 (45%) residential. In 1998, approximately 31,904 tons of recyclable material was recovered from the waste stream. The Charles County recycling program accepts the following:

- Newspaper, magazines & small catalogs
- Yard Waste, Brush, Grass & Leaves
- Motor Oil, Oil Filters & Antifreeze
- Aluminum & Tin Cans
- Plastic Bottles & Jugs
- Glass Bottles & Jars
- Office Paper
- Cardboard
- Textiles
- Tires
- Scrap Metal
- Batteries

TABLE 3-2

ESTIMATED MUNICIPAL WASTE STREAM COMPOSITION

Component	Percent of Municipal Waste Stream		
	Residential	Commercial/Industrial and Institutional	Total Municipal
Newspaper	22.33%	23.48%	22.91%
Corrugated Cardboard	1.13%	45.44%	23.28%
Other paper	0.20%	19.72%	9.96%
Glass	0.30%	0.09%	0.20%
Aluminum	1.81%	0.71%	1.26%
Ferrous			
Plastics	5.38%	1.22%	3.30%
Food Waste			
Yard Waste	50.71%		50.71%
White Goods	15.54%	4.54%	10.04%
Textiles/Leather		0.44%	0.44%
Tire/Rubber	2.42%	0.08%	1.25%
Household Hazardous Waste			
Other	0.19%	4.29%	2.24%
Total	100.00%	100.00%	100.00%

Source: 1999 Charles County - Maryland Recycling Tonnage Report

3.5 BASELINE STATISTICS FOR WASTE GENERATION

The Charles County recycling effort was initiated 1989 and this effort is reflected in the quantity of waste land filled. Recycling efforts have continued to reduce the amount of waste land filled as shown in Table 3-3. In 1999, approximately 41 percent (40,060 tons) of the recovered materials were from residential efforts; the remaining 59 percent (56,683 tons) was recovered from the commercial sector of the County, including commercial, industrial, and institutional establishments.

Table 3-4 has an accurate representation of the amount of waste land filled for the calendar year records of 1994 through 1999. The average-annual statistics during this period (calendar years) were used to calculate waste generation rates through 2010. Population and Employment data from the Charles County Department of Planning and Growth Management was used with the waste generation rates to calculate the projected waste quantities.

3.5.1 Residential Waste Generation

Based on the average population (1994-1999) of 126,563, the average daily residential waste generation in Charles County is 2.52 pounds per person or 0.46 tons per person, per year.

3.5.2 Commercial/Industrial Waste Generation

Based on an average employment of 45,350 between the years of 1994 and 1999, the average daily generation rate for commercial/industrial waste is 2.99 pounds per employee, or 0.54 tons per year, per employee.

3.5.3 Institutional Waste Generation

Prior to 1994, the average institutional waste generation was 5,572 tons per year. The average-daily institutional waste generation is 0.56 pounds per employee based on an average employment of 34,700. The Charles County Landfill is no longer able to track institutional waste quantities or types due to commercial haulers combining institutional waste with commercial waste prior to disposal at the landfill.

3.5.4 Rubble Waste Generation

The average annual rubble waste landfilled in Charles County during 1991 through 1993 was 20,766 tons. Landfill personnel have indicated that there is a high probability that rubble waste generated in Charles County (particularly in the northern part of the County) is being exported out-of-county for disposal. Therefore, the rubble landfilled in Charles County is not reflective of the rubble generated in the County. This is due in part to the County's self imposed ban on homogenous loads of rubble from commercial contractors and haulers, and the relatively cost prohibitive tipping fee. the actual amount of rubble is estimated to be approximately 4,000 tons per year. Therefore, residential rubble waste or single-trip commercial loads are the primary contribution of rubble waste to the landfill, not commercial contractors.

TABLE 3-3

RECYCLABLES RECOVERED

TABLE 3-4

ESTIMATED WASTE GENERATION IN CHARLES COUNTY
1994-2010

			Waste Category (Tons)											
Year	Population*	Employment*	Residential	Commercial/ Industrial	Controlled Hazardous Substance	Dead Animals	Bulky	Tires	Sludge	Septage	Asbestos	Used-Oil	Antifreeze	Total
1994	114,755	35,900	48,797	25,093	3,351	112	3,141	1,148	2,094	4,817	126	502	247	89,428
1995	111,600	45,000	50,243	25,513	3,450	115	3,235	1,182	2,156	4,960	129	517	254	91,754
1996	113,850	46,120	51,689	25,932	3,549	119	3,328	1,216	2,218	5,102	133	532	261	94,079
1997	116,100	47,240	53,134	26,351	3,649	122	3,421	1,250	2,280	5,245	137	547	269	96,405
1998	118,350	48,360	54,581	26,771	3,748	125	3,514	1,284	2,343	5,388	141	562	276	98,733
1999	120,600	49,480	56,026	27,190	3,847	128	3,607	1,318	2,405	5,531	144	576	283	101,055
2000	122,850	50,400	57,472	27,610	3,947	132	3,700	1,352	2,467	5,673	148	591	291	103,383
2001	125,540	51,280	58,565	27,882	4,028	134	3,776	1,379	2,517	5,790	151	603	297	105,122
2002	128,230	52,160	59,825	28,155	4,108	137	3,851	1,407	2,568	5,905	154	616	302	107,028
2003	130,920	53,040	60,980	28,427	4,187	140	3,926	1,434	2,617	6,019	157	627	308	108,822
2004	133,610	53,920	62,120	28,700	4,266	142	3,999	1,461	2,666	6,132	160	639	314	110,599
2005	136,300	54,800	63,305	29,028	4,349	145	4,077	1,489	2,718	6,252	163	651	320	112,497
2006	138,990	55,680	64,490	29,356	4,432	147	4,155	1,518	2,770	6,371	166	664	326	114,396
2007	141,680	56,560	65,675	29,684	4,516	150	4,233	1,546	2,822	6,491	169	676	332	116,294
2008	144,370	57,440	66,860	30,012	4,599	153	4,311	1,575	2,874	6,610	172	689	338	118,193
2009	147,060	58,320	68,045	30,340	4,682	156	4,389	1,603	2,926	6,730	175	701	344	120,091
2010	149,750	59,200	69,230	30,667	4,765	158	4,467	1,632	2,978	6,849	179	714	351	121,990
	129,091	51,465												
Average Per Capita Generation														
Population Tons/Year			0.46		0.03	0.00	0.03	0.01	0.02	0.05	0.001	0.005	0.002	
Population Pounds/Day			2.52		0.17	0.01	0.16	0.06	0.11	0.25	0.007	0.026	0.013	
Employment Tons/Year				0.54										
Employment Pounds/Day				2.99										

(*) Projections from Charles County Department of Planning & Growth Management

3.6 WASTE PROJECTIONS

In Charles County, solid waste is generated through the activities of residents, businesses, industries, and institutions. Section 26.03.03.03D of *COMAR* requires that this Plan identify and quantify existing and projected solid waste generated within the County for the following waste categories:

- Residential
- Non-hazardous industrial
- Rubble
- Dead animals
- Tires
- Septage
- Commercial
- Institutional
- Controlled hazardous substances
- Bulky wastes
- Wastewater treatment plant sludge
- Other waste (which may be generated in significant quantities.)

Waste generation within Charles County during the period 1994 through 2010 is presented in Table 3-4 and discussed in the following paragraphs. Descriptions of each waste category and the methodology used to estimate quantities are presented in subsequent sections.

The data analysis, conclusions, and recommendations for the *Charles County Recycling Plan* are incorporated directly into this Solid Waste Management Plan, rather than incorporating the Recycling Plan by reference. However, it should be noted that the database used in this Plan for waste generation and recycling projections differs from that used in the *Charles County Recycling Plan*, resulting in different waste and recyclable quantities. The primary difference between the two data sets is that the Recycling Plan used waste generation data for fiscal year 1989, whereas this Plan uses a longer period of record (i.e., fiscal years 1991 through 1999) as a baseline to forecast generation and recycling. The rubble survey (Section 3.2.2.2) was used to update the *Charles County Recycling Plan* percentages for residential, commercial/industrial, and institutional and rubble waste land filled. The assumptions for the waste generation and waste composition made in the Recycling Plan are used in this Plan.

3.6.1 Residential Waste

Residential waste includes wastes generated by households in Charles County, except for dead animals, bulky wastes, and tires which are described in subsequent sections. Residential waste is either collected by commercial (private) haulers, municipal haulers, or brought to the landfill by individual residents. The projected generation of residential solid waste within the County is based on the residential waste delivered to the landfill plus the amount of residential recyclables recovered. Historic records were used to develop a baseline residential waste generation for the county as described in Section 3.5. The average daily residential waste generation for Charles County is 2.52 pounds per person.

3.6.2 Commercial/Industrial Waste

Commercial and non-hazardous industrial waste delivered to the landfill are not recorded separately, but are reported under a single category, as commercial waste. For the purpose of this Plan, commercial waste is defined as waste generated by private businesses and non-hazardous waste generated by industry. Commercial waste quantities discussed in this section do not include rubble, dead animals, bulky waste, tires, or sludge. Commercial waste is generally collected by commercial (private) or municipal haulers

and then taken to the landfill. The projected generation of commercial waste within the County is based on the commercial/industrial waste delivered to the landfill plus the amount of commercial recyclables recovered.

Baseline data for the commercial/industrial waste generation in Charles County was presented in Section 3.5. The average daily commercial/industrial waste generation in Charles County is estimated to be 2.99 pounds per employee.

3.6.3 Institutional Waste

Institutional waste includes wastes generated by federal, state, and county government facilities including the military, schools, hospitals, county maintenance, and state highway department, except for dead animals, bulky wastes, tires, or sludge which are described in subsequent sections. Institutional waste is either collected by commercial (private) haulers or municipal haulers and then taken to the landfill. Institutional waste is collected by commercial, municipal, and non-commercial waste haulers.

As discussed in Section 3.5, the quantity and type of institutional waste is not available through the Charles County Sanitary Landfill Records due to commingling of materials with commercial/industrial waste. Haulers collect waste from institutional establishments within the same trip or route to collect commercial/industrial wastes. Therefore, the quantity and type of wastes generated at these establishments is immeasurable at the landfill. Institutional waste is combined with commercial/industrial wastes for statistics of quantity and type of waste generated.

3.6.4 Rubble Waste

For the purpose of this plan, rubble includes land-clearing debris, construction debris, and demolition debris. Specific examples of waste permitted to be disposed of in a rubble landfill according to *COMAR* 26.04.07.13.B include trees, brush, rock, earthen materials, concrete, bricks, asphalt, wood, structural steel, plaster, insulation, roofing shingles and felt, household appliances, paper, and asbestos.

Reported rubble generation rates are highly variable, and are likely influenced by a variety of factors including home construction, business development, employment, reuse and recycling, disposal costs, available disposal space, proximity of generation point to the disposal facility, practices of illegal dumping, the importation of rubble waste generated outside the county for disposal, and exportation of rubble wastes generated within the county for disposal elsewhere. Verifiable historical data on the rubble waste generated within Charles County is not available. As of December 1999, the amount of rubble generated in the County remains unknown since Charles County still prohibits large commercial loads from the landfill.

3.6.5 Controlled Hazardous Substances Including Medical Waste

The term controlled hazardous substance (CHS) is used interchangeably with the term hazardous waste in Maryland regulations. Section 26.13.02.03 of *COMAR* provides a specific definition of hazardous waste, as any substance:

- That produces toxic, lethal or other injurious effects;

- That causes sub-lethal alterations to plant, animal or aquatic life;
- That may be injurious to human beings; and
- That is identified as a hazardous substance by EPA.

A Special Medical Waste (SMW) is classified as a CHS by the Maryland Department of the Environment (MDE), and is defined in Section 26.13.11.02.B(10) of *COMAR* as a solid waste that is composed of anatomical material, blood, blood-soiled articles, contaminated material, microbiological laboratory wastes, or sharps (e.g., syringes, needles, surgical instruments, etc.) and otherwise not excluded under Section 26.13.11.03 of *COMAR*. SMW is typically generated by hospitals and clinics, nursing facilities, doctor and dentist offices, and veterinary clinics. SMWs do not include household wastes, ash from authorized medical waste incinerators, and wastes from animals not suspected of carrying diseases infectious to humans.

CHS is not permitted to be disposed of in a municipal landfill, but must be handled, stored, collected, transported, processed, and/or disposed of in a specific manner that meets stringent state and federal regulations and guidelines. The MDE tracks the generation of CHS in Charles County and maintains a database using travel manifests for CHS. The database includes a listing of CHS generators and corresponding types and volumes of CHS reported. The MDE database for Charles County is provided in Appendix F.

CHS waste generation in the County is calculated as the total of the waste reported in the MDE travel manifests. The total CHS waste generated in Charles County is estimated to be 3,527 tons per year or an average of 0.16 pounds per person per day (based on the 1999 population of 120,800).

It should be noted that from a regulatory perspective, household hazardous wastes (HHW) are not the same as CHS. HHW are wastes classified as hazardous wastes that are generated in small quantities by residential users, whereas CHS are produced in larger quantities by businesses, industry and institutions. Examples of HHW are paints; organic solvents such as paint thinner, gasoline, and lighter fluid; household cleaners; lead acid batteries; and pesticides. It is permissible, under current state and federal regulations, to dispose of many HHWs in a municipal landfill. While these wastes can be disposed of legally in a municipal landfill, it is encouraged to bring these materials to the monthly HHW acceptance day at the landfill. HHW can be properly stored until the next county HHW collection day. HHW collected during these events is handled and disposed of in a similar fashion as CHS.

3.6.6 Dead Animals

Dead animals generated within Charles County include unwanted and dying animals euthanatized at the Tri-County Animal Shelter and by local veterinarians, animals killed by vehicles along county roadways, and farm animals that die or are euthanized. The Tri-County Animal Shelter reported that approximately 23 tons of dead cats, dogs and other small animals were handled in 1999 at the shelter. This facility accepts animals from residents, animal clinics, veterinarians, and the highway department. Animals are transported to an incinerator facility in Silver Spring, Maryland where they are cremated. No estimates for pets buried in cemeteries or agricultural animals buried on farms are readily available. It is assumed that the quantity of dead animals will increase with the population.

3.6.7 Bulky Wastes

Bulky wastes are primarily metal wastes contained in large items such as major appliances (i.e., white goods) and other scrap metals. In Charles County, bulky wastes are processed and recycled by commercial scrap metal dealers. White goods and other appliances are collected and processed for recycling by county personnel, commercial scrap metal dealers, and appliance dealers. Prior to disposal of white goods, refrigerant gases are vented and collected. White goods delivered to the landfill by residents and private haulers are segregated, compacted, and stored for pick-up by a local scrap-metal dealer.

Traditionally, the scrap metal industry has provided adequate recycling opportunities and economic incentives to recycle the majority of scrap metal and old automobiles. Accurate records on the amount of scrap metal and old automobiles generated and recycled in Charles County is not currently available. Applying historical records of accepted materials at the County Landfill to the population of 120,800 people in 1999, the per capita generation rate is estimated 0.15 pounds of white goods per day per person.

3.6.8 Tires

The majority of used tires generated in the County are taken to a recycling or storage facility directly from the retailers who change tires. Currently, the Charles County Sanitary Landfill prohibits the disposal of tires at the facility; however, a tire collection location is provided at the landfill. Tires collected at the landfill are recycled. A statewide "tire recycling fee" of $0.40 per new tire sold in Maryland was established in 2000. This fee is assessed to fund the clean up and recycling of used tires. Any tire disposal fee that is assessed by commercial tire facilities or at the county landfill is a local charge and not a state fee.

EPA documentation recommends a generation rate for used tires of one 20-pound tire per person per year, or 0.05 pounds per person per day. This generation rate is used to project the generation of used tires in Charles County. Charles County handled 389 tons in 1999 through it's recycling centers.

3.6.9 Sludge

3.6.9.1 Wastewater Treatment Plant Sludge

As previously stated in Section 1.5.3.3, Charles County Resolution No. 92-75 bans the disposal of sludge in the landfill, except in emergency situations. In the event of an emergency situation, sludge may be disposed in the Charles County landfill for the established tipping fee. Generally, sludge is used as a soil conditioner and land-applied to permitted sites throughout Charles County.

Wastewater treatment plant (WWTP) sludge from the Mattawoman WWTP in Charles County and the Blue Plains WWTP in Washington, D.C. is permitted for land application on approximately 5,890 acres of land within Charles County. The sites permitted for sludge application include 64 farm sites and 9 reclaimed gravel mines. During the calendar year 1999, approximately 3000 dry tons of biosolids were land applied to properties in Charles County. Of this amount, approximately 450 dry tons originated outside of Charles County.

Charles County currently receives sewage sludge for land application from the following Maryland Department of the Environment approved treatment plants:

- Parkway
- Broadneck
- Broadwater
- Cox Creek
- Patuxent
- Naval Academy
- Herrington Harbor
- Maryland City
- Annapolis
- Back River
- Mattawoman
- Alexandria
- Fredrick
- Hanover
- Piscataway
- Blue Plains
- Little Patuxent
- Penn Township
- York
- Seneca
- Patapsco
- Damascus

The County reviews all transportation sludge permit applications. These applications are reviewed for compliance with county policies, as well as other rules and regulations. Applications are approved with conditions, or denied by the County Commissioners.

3.6.9.2 Water Treatment Sediments

Water treatment systems that use surface water as their source (e.g., streams, rivers, reservoirs) produce sediments or sludge as a waste by-product of the treatment process. There are no water treatment systems currently operating in Charles County and no water treatment sediment is imported into the County for land disposal.

3.6.10 Septage

Septage is the material removed from chemical toilets, septic tanks, seepage pits, privies, or cesspools. Since 1992, MDE regulations require that septage be treated as raw sewage at a permitted wastewater treatment plant. The disposal of raw septage directly on land surfaces is illegal in Maryland. In Charles County, septage is accepted for treatment at the Mattawoman WWTP.

Records from the Mattawoman WWTP indicated that a total of 24,154 tons of septage was delivered to the WWTP by scavengers (septage haulers) during Fiscal Year 1998. Based on an average population of 117,225 for 1997 and 1998, the average daily generation of septage is 0.21 pounds per person.

3.6.11 Asbestos

Prior to 1970, asbestos was frequently used as insulation for boilers, heating systems, and piping in buildings and as structural material in floor and ceiling tile and exterior siding. The discovery that asbestos is carcinogenic when inhaled prompted the EPA and MDE to require its removal from certain structures (e.g., schools) and to regulate its handling and disposal. Thus, asbestos waste is generated from the demolition and rehabilitation of structures containing asbestos materials. Municipal and rubble landfills can accept asbestos waste provided that it is allowed by the MDE refuse disposal permit and specific handling procedures are followed to prevent fibers from becoming airborne. At present, it is the County's policy not to accept asbestos at the Charles County Sanitary Landfill; therefore, no county records exist on asbestos disposal. Asbestos is not classified as a controlled hazardous substance; therefore, no tracking records are available for asbestos waste generated within the County.

There is no substantial demand or requests for asbestos disposal from Charles County residents and agencies. The absence of significant quantities of asbestos is largely due to the development history of the County. In 1950, the population was approximately 23,415 which grew to approximately 47,683 in 1970 and to 101,154 in 1990. Therefore, the vast majority of development and construction occurred after 1970 when asbestos was no longer used as a building material. In addition, asbestos has already been removed from the facilities operated by the Charles County Board of Education and the Charles County Government.

3.6.12 County Maintenance Debris

County operations generate small quantities of debris from cleaning streets, litter, and catch basins. The quantities of debris generated from Charles County maintenance operations are accounted for in the institutional (commercial/industrial) portion of the waste stream projections.

3.6.13 Agricultural Waste

Agricultural wastes include organic residues from crop production, livestock manure, and used containers from pesticides and herbicides. Generally, agricultural wastes are reused on the farm. For example, manure is used as fertilizer and organic debris is plowed into the land. Although not identified as such, small quantities of agricultural waste entering the Charles County Sanitary Landfill are accounted for as commercial waste. Because most of these wastes are recycled on-site, agricultural wastes are not a significant solid waste management issue within the County.

3.6.14 Recreational Waste

Waste from parks and other recreational facilities including solid waste and septage is accounted for as institutional or septage waste.

3.6.15 Mining Waste

Several sand, gravel, and clay surface mines are operated in Charles County. The primary solid waste associated with quarrying operations is overburden (soil) which is usually stockpiled on-site or sold as clean fill to the construction industry. Although quantities of this material are significant, it does not currently pose a solid waste management problem in the County.

3.6.16 Used Oil and Antifreeze

Many industries and businesses collect their used oil and antifreeze for recycling or reuse. However, the "do-it-yourselfers" are estimated to handle approximately 60 percent of waste oil in Maryland. Waste oil and antifreeze are collected for recycling by the Maryland Environmental Service (MES) and commercial establishments such as garages and service stations. Maryland Environmental Service provides a waste oil and antifreeze collection service in Charles County. There are numerous garages, service stations, and retailers which collect waste oil and antifreeze for recycling. Charles County also offers several oil and antifreeze recycling locations as listed in Table 3-5.

The MES program in Charles County collected a total of 49,180 gallons of waste oil in 1999. The antifreeze collection program has collected 2,795 gallons during the same time period. MES reports that approximately 4 to 6 million gallons of waste oil are generated annually in Maryland. The U.S. Bureau of the Census estimates that the population for Maryland in the year 2000 will be approximately 5,274,850 which provides for a conservative generation rate of 1.25 gallons per person per year of waste oil. The generation of antifreeze was not provided in available documentation. However, for this plan it is assumed that the generation of waste antifreeze is approximately 0.50 gallons per person per year. Based on these assumptions and using a density of 7.0 pounds per gallon for oil and 8.6 pounds per gallon for antifreeze, 537 tons of used oil and 264 tons of used antifreeze will be generated in Charles County during the year 2000.

In 1999, Marylanders recycled 792,776 gallons of used motor oil and 37,126 gallons of antifreeze. As mentioned above, Charles County citizens recycled 49,180 gallons of used motor oil and 2,795 gallons of antifreeze in 1999.

3.7 IMPORTED WASTES

Currently, WWTP sludge is the only waste imported to Charles County for disposal or processing. The quantity of WWTP sludge imported into the County as well as the procedures for ensuring that imported waste is not disposed in the Charles County Sanitary Landfill are discussed in the following sections.

3.7.1 Wastewater Sludge

Approximately 1,602 dry tons of municipal wastewater sludge from the Blue Plains WWTP was transported into the County in 1991 (2,937 dry tons for January 1991 through October 1992) for land application at permitted farms and marginal mine sites throughout the County as discussed in Section 3.6.9.1. Assuming that the volume of wastewater sludge imported into the County increases one percent each year, approximately 1,634 dry tons of sludge was imported into the County during 1993.

Charles County has received sewage sludge from ten MDE approved WWTPs (Section 3.6.9.1). Permits for the transportation of sewage sludge within Charles County are issued by the Charles County Commissioners.

3.7.2 Municipal Waste

As outlined in Section 3.3.1, the ultimate disposal of solid waste is market driven as opposed to local regulatory laws. The County still has in effect its regulation that prohibits the importation of solid waste into its landfill. Although not disposed of in the Charles County landfill, it is interesting to note that several times more waste travels through Charles County each day on U.S. Route 301 than is generated within the County. This waste is destined for one of several large landfills in Virginia and is hauled in large tractor trailers. The waste is hauled in a large transfer trailers which look very similar to cargo trailers so that the average individual has no idea of its contents.

3.8 EXPORTED WASTES

Neighboring counties have municipal waste importation policies similar to Charles County, and may have higher tipping fees; therefore, it is believed that no significant amounts of municipal waste generated in the County are sent to other jurisdictions. As previously discussed, recyclables, rubble, controlled hazardous substances, dead animals, and asbestos are exported out-of-county for processing and disposal.

3.8.1 Recyclables

As discussed in Section 3.4, 31,904 tons of recyclables were reported during the period of January 1, 1998 through December 31, 1998. These recyclables were transported out-of-county for processing.

TABLE 3-5

RECYCLABLE DROP -OFF CENTERS

Drop-off/Map Designation (c)	Hours	Household Batteries	Newspaper	Magazines	Tag a Bag	Alluminum Cans	Tin Cans	Plastics (a)	Glass (b)	Oil and Antifreeze	Scrap Metal	Yard Waste	Brush
Charles County Landfill	Mon-Sat; 7am-7pm	x	x	x	x	x	x	x	x	x	x	x	x
Pisgah Recycling Center	Mon-Sat; 7am-7pm	x	x	x	x	x	x	x	x	x	x	x	x
Gilbert Run Recycling Center	Wed 11am-7pm, Sat 8am-4pm	x	x	x	x	x	x	x	x	x	x	x	x
Cobb Island Recycling Center	Wed 11am-7pm, Sat 8am-4pm	x	x	x	x	x	x	x	x	x	x	x	x
Benedict Recycling Center	24 hours a day		x	x		x	x	x	x	x			
Bel Alton Recycling center	24 hours a day		x	x		x	x	x	x	x			
Pinefield, Country Lane	24 hours a day									x			
Westlake	24 hours a day									x			
Ruth B. Swann Park	24 hours a day									x			
Charles County Public Facilities	24 hours a day									x			

3.8.2 Rubble

It is likely that a significant amount of the rubble generated in the northern part of the County is disposed at out-of-county rubble landfills. The survey conducted by landfill personnel in 1994 indicated that approximately 25 percent of the waste stream land filled was comprised of rubble (baseline generation was 20,766 tons); however, based on the generation rate of a similar county, approximately 63,637 tons of rubble are estimated to be generated within Charles County annually (Section 3.6.4). This suggests that approximately 67 percent (42,637 tons) of rubble generated within Charles County is transported out-of-county for disposal. This estimate should be interpreted cautiously since there are no reliable records on rubble generation in the County.

Within recent years, two companies that mine and sell aggregates now process old concrete into a recycled aggregate. They are Chaney Enterprises in Waldorf, and Seven Star Aggregates in La Plata. Their processing figures are unknown.

3.8.3 Controlled Hazardous Substances

Controlled hazardous substances generated within the County are exported out-of-county for processing or disposal, as previously discussed in Section 3.6.5. As shown in Table 3-5, an estimated 3,847 tons of controlled hazardous substances were generated in 1999 and subsequently exported out-of-county for processing. Based on the 1999 population of 120,800, the CHS generation rate was 0.17 pounds per person each day.

3.8.4 Dead Animals

Approximately 23 tons of dead animals were removed from the Tri-County Animal Shelter and transported to a renderer outside the County (Section 3.6.6) during 1999.

3.8.5 Tires

Charles County handled approximately 389 tons of tires through its tire recycling program in 1999. These tires were collected and transported out-of-county for recycling.

3.8.6 Asbestos

Charles County did not accept any measurable amount of asbestos containing material during the 1999 calendar year at the Landfill. The Charles County Sanitary Landfill only accepts asbestos materials from government facilities within the County. Asbestos materials within government buildings are believed to be removed and no materials are expected in the future.

3.8.7 Household Hazardous Waste

The County conducts a household hazardous waste collection program the first Saturday of every month at the County's landfill, except for January, February and March. This service is provided by a private contractor with an annual budget of $50,000 for the past years of 1997, 1998 and 1999. It is estimated that this waste accounts for 60,000 pounds of material annually.

3.9 COLLECTION SYSTEMS

The existing collection system for solid waste and recyclables in Charles County includes privately owned collection companies, municipal collection, self-hauling, and facilities handled by the county roll-offs. These systems are described in the following sections.

3.9.1 Solid Waste Collection

Residential, commercial, industrial, and institutional waste generated in Charles County is collected and hauled to the Charles County Sanitary Landfill for disposal. The majority of waste generated within the unincorporated areas of the County and Port Tobacco is collected by privately owned companies contracted for collection services by individuals. The incorporated Towns of Indian Head and La Plata provide municipal collection services for waste generated within these areas. Charles County provides a roll-off system for several county facilities and projects. The option for individuals to self-haul waste to the landfill is also available for any resident of Charles County. Ten drop-off centers for recyclables exist through the County, as well as several locations where residents can purchase garbage disposal bags for the "Tag-A-Bag" program.

3.9.1.1 Free Enterprise

Most residential, commercial, and industrial waste generated in Charles County is collected and delivered to the Charles County Sanitary Landfill by privately owned companies. This free enterprise system allows individuals, residents, landlords, businesses, industries, and institutions to contract with the private company of their choice to provide waste collection services.

The frequency of collection, frequency of billing, and cost for the collection service varies depending on the company. Payment for collection service is provided directly from the individual contracting for the service to the collection company.

The 1999 Charles County Sanitary Landfill records indicate that the following private collection companies (19) collect waste from the unincorporated areas of the County and Port Tobacco.

- A.A. Reliable Trash Service
- A.R. Ridner Trash Service
- Case Waste
- Affordable Refuse
- Bennet Trash Service
- Browning-Ferris Industries
- Butler's Refuse Company
- Francis Refuse
- Gardiner Hauling
- Newburg Trash Service
- Calvert Disposal
- Proctor's Trash Service
- EAI Inc.
- T&S Trash Service
- Thompson's Trash Service
- Washington Hauling
- Waste Management of Southern Maryland

3.9.2.1 Municipal Programs

Solid waste generated within the incorporated Towns of Indian Head and La Plata is collected by services provided by the respective municipalities.

The Town of Indian Head provides semi-weekly curbside collection for residents (1,740 households) and either curbside or dumpster service to commercial establishments. The Town of Indian Head also provides a special bulky waste collection service in the spring and fall. Residents and businesses are billed monthly for solid waste collection services.

The Town of La Plata provides weekly curbside collection services to about 2,200 households and commercial establishments. In the fall and summer, the Town of La Plata also provides special collection for yard waste which is taken to the County's composting facility. Residents are billed monthly for solid waste collection services. Commercial and institutional customers may use the Town or private company.

3.9.1.3 Self Hauling

Individuals in Charles County have the option to haul their own waste to the Charles County Landfill or the three compactor sites (Breeze Farm, Gilbert Run or Pisgah Recycling Center). Self-hauling is the primary method to dispose of large bulky items such as furniture or appliances since municipal and private collection services do not provide for bulk pick-up on a regular basis. Residents take their waste to the residential convenience center located near the entrance of the landfill. This waste is collected in roll-off boxes and taken to the working face of the landfill by county personnel for disposal.

Self-haulers are assessed a fee of $0.50 per bag or container of refuse, no larger than 32 gallons. Refuse not in bags or containers is subject to the tipping fee rate (currently $57 per ton).

3.9.1.4 County Roll-Off System

Charles County provides roll-off containers for several county facilities and projects. Waste deposited in these containers is collected by Charles County personnel. Currently, the County is providing roll-off containers for the White Plains Golf Course, Department of Public Facilities Maintenance Facility, Mattawoman WWTP, public facility maintenance projects, county construction projects, and community clean-ups.

3.9.1.5 Tag-A-Bag Program

The drop-off centers at Gilbert Run Park and the Breeze Farm WWTP provide containers for residents to dispose of their solid waste. Residents are assessed a fee of $0.50 per bag or container of refuse, no larger than 32 gallons.

3.9.2 Recyclables Collection

Recyclables source-separated from the Charles County waste stream are collected by privately owned companies, municipal services, and by residents taking their recyclables to drop-off centers. Curbside collection of residential recyclables from the unincorporated areas of the County is provided through a county contract with private collection companies. Drop-off centers located throughout the County are used by county residents living in areas not served by curbside collection.

Curbside collection of residential recyclables is provided in the Towns of Indian Head and La Plata. La Plata uses a private company (BFI) to do their residential curbside collection. Commercial, industrial, and

institutional recyclables are mostly collected through private subscription. The recyclables collection program employed by the County is described in the following sections.

3.9.2.1 Residential Curbside Collection – Unincorporated Areas

The County contracts with privately owned collection companies to provide curbside collection of recyclables in unincorporated areas of the County. Curbside collection is available to approximately 22,500 households within an area generally north of the La Plata area in the Development District. Due to the number of ever-growing homes within the County, annual Route Audits are conducted to identify new growth and determine the expansion of the program. Detailed route listings track the neighborhoods and streets who currently receive curbside collection and denotes their day of service.

Each household within the collection area is given a recycling bin to collect their recyclables and to place at the curb for weekly collection. Recyclables collected include aluminum, tin, glass, plastic, newspapers, magazines, small catalogs and phone books. The collection company sorts the materials at the curb and delivers them to the County's Recycling Consolidation Center at the Landfill. Collection services for recyclables in the unincorporated area of the County are paid through an environmental service fee.

The residential recycling program in unincorporated areas had an average participation rate of 40 percent during 1999. The County's Maryland Recycling Act (MRA) recycling rate exceeds the mandated State recycling goal of 15 percent for a county with a population less than 150,000. The MRA calculation for Charles County can be found in Appendix F.

3.9.2.2 Residential Curbside Collection - Incorporated Areas

The Town of Indian Head provides approximately 1,740 households with curbside collection of recyclables. The recyclables collected include aluminum, tin, glass, plastic, and newspaper. The residents of Indian Head place commingled materials in their recycling bin once a week for collection. Municipal haulers collect the recyclables and deliver them to a central collection point where a private hauler collects the materials and takes them to markets. Recyclable collection in Indian Head is paid for by the individual as part of solid waste collection services.

The Town of La Plata provides curbside collection of recyclables to approximately 2,200 households. Collected recyclables includes aluminum and tin cans, glass, and newspapers. Residents place the commingled recyclables in their recycling bin for weekly curbside collection. Residential curbside collection in La Plata is also paid by the individual as part of the monthly bill for waste collection services.

3.9.2.3 Drop-Off Centers

Charles County provides ten (10) permanent recycling centers with a range of materials accepted at each, and a composting facility at the County Landfill. In addition to county operated centers, there are numerous private locations for residents to take their recyclables including scrap metal dealers (scrap metal and old appliances) and local charity groups and organizations which collect recyclable materials for fund raising events. Table 3-5 identifies these drop-off centers, their locations, hours of operation, and materials accepted. Figure 3-1 shows the locations of the various acceptance facilities throughout the County.

3.10 RECYCLING PROGRAMS

A combination of public and private programs serve the two main sectors of potential recyclers: residents and commercial businesses (commercial, industry, and institutions). Recycling programs for each of these sectors are described in the following sections.

3.10.1 Residential Programs

Residential recycling programs are provided by Charles County in the form of curbside collection or drop-off centers. The curbside collection program provided for the unincorporated areas of the County is described in Section 3.9.2.1; curbside programs for the Towns of Indian Head and La Plata are presented in Section 3.9.2.2. The County operates a number of recycling drop-off centers which accept recyclable materials from county residents. These drop-off centers are identified and detailed in Table 3-5.

Other residential recycling opportunities for Charles County residents include the following:

- Christmas Tree mulching at the County's yard waste collection facilities and at designated parks. The mulch is used by the County, municipal parks and county residents.

- White paper may be taken to the Charles County Government Building.

- Scrap metal such as old appliances and bicycles may be taken to the Charles County Landfill, Pisgah Recycling Center, Gilbert Run Recycling Center or the Breeze Farm Recycling Center.

- Lead-acid car batteries may be taken to any of the above mentioned facilities or Waldorf Metal, Inc. in Bryantown, Maryland.

- Tires may also be taken to any of the above mentioned facilities (except Waldorf Metal).

3.10.2 Commercial, Industrial, and Institutional Programs

Numerous commercial, industrial, and institutional establishments are collecting recyclables such as office paper, corrugated cardboard, aluminum cans, glass, plastics, newspapers, oil, and antifreeze for recycling. Most businesses contract for collection and/or marketing of their recyclables. Some larger organizations, such as grocery store chains, department stores and paper companies, generate quantities of recyclables that make it practical to provide their own collection and marketing.

Recycling programs are in operation at several local institutions including the Naval Surface Weapons Center, Civista Hospital, County Board of Education, and county and state offices. The recyclables recovered by commercial, industrial, and institutional sources are transported outside the County for processing.

3.11 SOLID WASTE ACCEPTANCE FACILITIES

Information on inactive, existing, and proposed solid waste acceptance facilities in Charles County is presented in Table 3-6. Locations of the facilities are illustrated in Figure 3-1.

3.11.1 Bumpy Oak Road Landfill - Inactive

The Bumpy Oak Road Landfill is located on a 20 acre site. The landfill was active from 1958 until it was closed in 1974.

3.11.2 Pisgah Landfill - Inactive July 1994

The Pisgah Landfill is located on Maryland Route 425 (Marshalls Corner Road), approximately one-quarter mile southwest of the intersection of Maryland Route 425 and Maryland Route 484. The site comprises about 87 acres of land in a rural section of Charles County. The landfill was closed in 1994 and the process for capping the site was completed in 1998.

3.11.3 Charles County Landfill - Active

The Charles County Sanitary Landfill, is located on Billingsley Road, about 3/4 of a mile west of the intersection of Maryland Route 5 and Billingsley Road. The site encompasses 114 acres; the waste fill area will cover approximately 70 acres. MDE issued a Refuse Disposal Permit for the facility in 1994.

The landfill consists of four cells with a total disposal capacity of approximately 4,320,000 cubic yards.

- Cell I - 726,000 Cubic Yards
- Cell II - 1,196,000 Cubic Yards
- Cell III - 1,170,000 Cubic Yards
- Cell IV - 1,228,000 Cubic Yards

The base liner consists of a two-foot bentonite-amended soil layer (permeability, $k = 1x10^{-7} = 1x10^{-7}$ centimeters per second) overlain by a high density polyethylene (HDPE) geomembrane. A drainage layer, geotextile, and protective soil layer was placed over the liner. Leachate is collected by a perforated pipe network within the drainage layer; and collected leachate is trucked to a sanitary sewer.

Ancillary facilities at the site include a public refuse disposal area, a recycling drop-off area, yard waste composting facility, scale house and platform scale, a guard house, and a maintenance building including administration facilities. New software programs that maintain billing and waste records have significantly improved record keeping methods. The landfill operates from 7:00 a.m. to 7:00 p.m., six days a week.

The Charles County Landfill will have a useful life of approximately 25 to 30 years depending on the type of daily cover used (soil or synthetic) and the amount of rubble disposed. Section 4.7.2 provides a discussion of the operational procedures and calculation for determining the life expectancy of the landfill.

3.11.4 Yard Waste Processing Facility - Active

The Charles County Yard Waste Processing Facility is located at the Charles County Sanitary Landfill in Waldorf on what will eventually be Cell II. With the use of the truck scales at the Landfill, there is now an accurate accounting of inbound yard waste and outbound mulch and compost. Compost from the facility is used by the Charles County Government and county residents.

3.11.5 PEPCO Pozzolan Management Facility - Active

The Potomac Electric Power Company (PEPCO) Pozzolan Management facility is located on a 140-acre site located northeast of U.S. Route 301 and Maryland Route 234. The electric company disposes of approximately 650 to 850 tons of pozzolan (fly ash) daily at the facility.

3.11.6 Naval Surface Weapons Center Incinerator - Active

The incinerator at the Naval Surface Weapons Center processes about 1 ton of classified documents annually at the facility. Personnel at the facility indicate that the documents are increasingly being shredded into fine elements and then collected by a recycler.

TABLE 3-6

SOLID WASTE ACCEPTANCE FACILITIES

Facility	Map Designation*	Location	Size	Maryland Grid Coordinates	Waste Accepted	Type of Quantity	Owner	Permits Status	S
INACTIVE									
Bumpy Oak Road Landfill	*N/A*	*Bumpy Oak Road*	*20 Acres*	-	-	-	*Charles County*	-	
Pisgah Sanitary Landfill	*(Recycling Ctr.) 2*	*1/4 mile SW intersection MD Rt. 484 & Rt. 425*	*89 Acres*	*255 N/ 756 E*	-	-	*Charles County*	-	
Radio Station Road Yard Waste Processing Facility	*N/A*	*Radio Station Road*	*45 Acres*	-	-	-	*Charles County*	-	
Physicians Memorial Hospital Incinerator	*N/A*	*Near intersection of Md Rt. 6 & Willow Ave. in La Plata*	*Hospital is on 10 Acres*	-	-	-	*Physicians Memorial Hospital, Inc.*	-	
Naval Sueface Surface Warfare Center Incinerator	*N/A*	*Naval Surface Weapons Center*	*Classified*	*275 N/ 750 E*	*Classified Documents*	*One Ton per year*	*Federal Government*	*1997-Win-0529*	C
ACTIVE									
Charles County Landfill	*1*	*1.35 miles SE of Piney Road & St. Paul's Drive*	*114 Acres*	*269 N/ 823 E*	-	-	*Charles County*	*1995-WSF-00760*	
PEPCO Pozzolan Mgmt. Facility	*N/A*	*NW of intersection of US Tr. 301 & MD Rt. 234*	*140 Acres*	*210 N 815 E*	*Pozzolan (Coal Ash)*		*Potomac Electric Power Co.*		
*Drop-off Centers**	*1-10*	*10 sites*	*Varies*	*Varies*	*Recyclables*	*Varies*	*Charles County*	*Not required*	C
Proposed -None-	*N/A*								

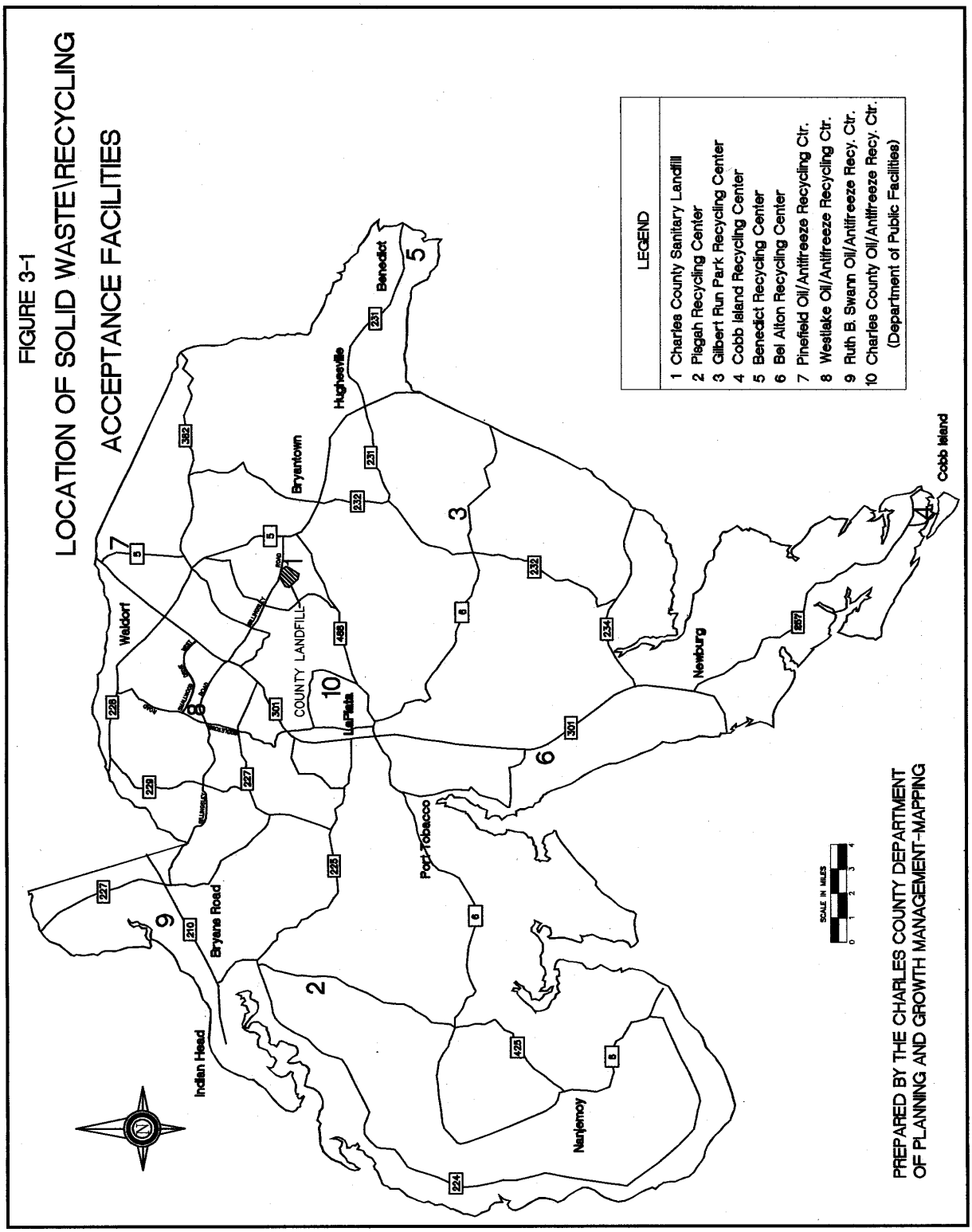


FIGURE 3-1
LOCATION OF SOLID WASTE\RECYCLING
ACCEPTANCE FACILITIES
LEGEND
1 Charles County Sanitary Landfill
2 Pisgah Recycling Center
3 Gilbert Run Park Recycling Center
4 Cobb Island Recycling Center
5 Benedict Recycling Center
6 Bel Alton Recycling Center
7 Pinefield Oil/Antifreeze Recycling Ctr.
8 Westlake Oil/Antifreeze Recycling Ctr.
9 Ruth B. Swann Oil/Antifreeze Recy. Ctr.
10 Charles County Oil/Antifreeze Recy. Ctr.
(Department of Public Facilities)
COUNTY LANDFILL
Waldorf
Bryantown
Hughesville
Benedict
LaPlata
Newburg
Port Tobacco
Bryans Road
Indian Head
Nanjemoy
Cobb Island
SCALE IN MILES
PREPARED BY THE CHARLES COUNTY DEPARTMENT
OF PLANNING AND GROWTH MANAGEMENT-MAPPING

Metals collected from the facility which are potentially explosive (e.g., spent shells) are burned on-site prior to being sent to a recycler.

3.11.7 Drop-off Centers - Active

A number of public drop-off centers are located in Charles County which accept recyclable materials from county residents. These facilities have been identified and detailed in Table 3-5. Locations of these facilities are also shown in Figure 3-1.

3.11.8 Sludge Land Application Sites - Active

Approximately 5,890 acres of privately held land within Charles County is permitted for the land application of sludge. Currently, there are 9 reclaimed mine sites and 64 farms which are receiving de-watered, treated sludge for land application. Approximately 200 to 500 tons of sludge are applied to sites in Charles County each month.

3.11.9 Mattawoman WWTP - Active

The Mattawoman WWTP is owned and operated by Charles County. The facility is located near the intersection of Maryland Routes 224 and 225. All of the wastewater generated from the public water and sewerage system within the Charles County Development District flows to the Mattawoman plant for treatment. In addition to wastewater, the WWTP accepts approximately 25,000 wet tons of septage for treatment.

3.12 ILLEGAL DUMPING AND LITTER

Since the original establishment of the Environmental Crimes Task Force (Catch A Dumper) in 1993, the Charles County Department of Public Facilities has enacted the current program to address illegal dumping and litter. To help prevent littering activities, the Task Force has embarked upon a public relations campaign that involves the following:

- Anti-Litter Billboards
- Presentations at Area Schools
- Exhibits at Trade Fairs/County Fairs
- Distribution of Anti-Litter Promotional Items
- Anti-Litter "Theme" Contests with Schools
- Press Releases
- Space Ads in the Printed Media
- Signage on County Vehicles
- Memorandum to County Staff encouraging them to "Catch-A-Dumper"

3.13 MULTI-JURISDICTIONAL SOLUTIONS

The Regional Solid Waste Management Task Force of the Tri-County Council for Southern Maryland developed the following recommendations for long-term solid waste management within the tri-county region.

- Regional Waste-to-Energy Facility
- Regional Materials Recovery Facility (MRF)
- Regional Rubble Landfill
- Regional Collection of Household Hazardous Waste
- Regional Yard Waste Composting
- Regional Policy and Management Efforts (e.g., public education, procurement, market development, volume-based fees)
- Citizens Advisory Committees (regional and county)

CHAPTER 4

ASSESSMENT OF SOLID WASTE MANAGEMENT ALTERNATIVES

4.1 CHAPTER SUMMARY

Chapter 4 evaluates the ability of the existing solid waste management system to meet the stated goals and objectives in the Solid Waste Management Plan. Feasible alternative technologies, management techniques, and regulatory modifications that could be used to meet identified deficiencies are discussed. In addition, siting constraints for potential new management facilities are reviewed.

A summary of the alternatives is presented in a series of tables at the end of this chapter. This information will also be assessed in the Action Plan.

4.2 COLLECTION SYSTEM (MUNICIPAL WASTE AND RECYCLABLES)

Alternatives for the collection of residential and other non-rubble waste and recyclables include the free enterprise system, licensing, franchising, and public operation. Each of these collection alternatives is described below to provide a basis for evaluating the County's existing collection system.

4.2.1 Assessment of Collection System Alternatives

4.2.1.1 Free Enterprise System

The free enterprise system operates by private subscription for waste collection services. Individual homeowners, apartment complexes, commercial establishments, industries, or institutions contract directly with a private hauler to collect their solid wastes and recyclables. Individual clients are billed for services by the private hauler. The remaining residents who do not contract with a private company haul their own solid waste directly to the landfill and take their recyclables to drop-off centers. The advantages and disadvantages of the free enterprise system are described below.

A. Advantages:

The free enterprise system requires minimal involvement and financing by the local government (i.e., Charles County, Town of Indian Head, Town of La Plata). The individuals or commercial establishments are free to deal with the hauler of their choice. If service is unsatisfactory, there are no barriers to choosing another hauler. The cost for hauling and disposal of the waste is billed directly to the customer. Private enterprise is encouraged with the free enterprise system. Opportunities exist for any small entrepreneur who desires to go into business. Residential customers in the Town of La Plata must have their trash collected by the Town.

B. Disadvantages:

In a free enterprise system, overlapping routes are prevalent. Often, a neighborhood or block will be serviced by several private haulers. In terms of labor, equipment, operation, and maintenance, this system is potentially less cost effective than a system with assigned routes that do not overlap. However, it is difficult to determine the potential cost savings, or if current charges are excessive.

Due to the lack of public involvement with the free enterprise system, it is often difficult to implement modifications to collection practices that may be desirable to meet the goals and objectives of a local government's solid waste management plan, such as volume-based billing for collection services and mandatory collection of recyclables by solid waste haulers. Waste flow control is more difficult to attain under the free enterprise system. When collection is voluntary, vagrant dumping to avoid collection fees or trips to the landfill could also pose a problem.

4.2.1.2 Franchising

Under a franchise system, a local government contracts with one or more private waste haulers to provide collection services. For large jurisdictions, such as a county government, the local government's jurisdiction can be divided into collection districts with approximately equal residential population. Municipalities could comprise a separate collection district, or could form a district with adjacent unincorporated areas, at the discretion of elected municipal officials. One private hauler is awarded the collection contract for each district based on competitive bidding. The private hauler would be responsible for billing each customer for collection and disposal services according to the rate established in the competitive bidding process.

The local government would be responsible for determining the number and geographic location of collection districts, and establishing uniform performance requirements and standards for the franchisee. Local government staff members would be required to conduct the franchise award process and administer the contracts. The following considerations must be addressed by the local government in order to implement a franchise system:

- Contract Duration
- Mandatory or Voluntary Collection
- Collection of Recyclables
- Provision of Containers for Refuse and Recyclables
- Frequency of Collection (refuse, recyclables, yard waste, white goods, and bulky items)
- Servicing of Multi-family Housing, Commercial, Institutional, and Industrial Establishments
- Collection Hours and Days
- Performance Standards (e.g., spillage, litter, noise, equipment)
- Personnel Training
- Designated Disposal or Processing Facility
- Annual Adjustments to Service Rates Based on a Certified Operating Cost Statement
- Billing and Bill Collection Procedures
- Performance Bond
- Insurance, Indemnification, and Record-keeping

A. Advantages:

The elimination of overlapping collection routes and the competitive bidding for those routes should result in the reduction of collection costs for homeowners and businesses. More efficient routing for collection vehicles results in less fuel consumption, traffic, and exhaust emissions. The franchise system gives a local government the opportunity for flow control, and facilitates the implementation of new management policies through incorporation of requirements in franchise contracts.

Although recyclable collection and volume-based billing can be implemented in the free enterprise system, the increased control afforded to a local government in a franchise system would facilitate implementation and monitoring of these measures.

Mandatory collection can significantly reduce the occurrence of vagrant dumping, roadside litter, and the introduction of waste generated outside the local jurisdiction into the local solid waste management system.

B. Disadvantages:

Franchising results in increased bureaucracy at the expense of the free market. Establishment of a franchise system would probably result in the elimination of several private haulers from collection activities within the local jurisdiction. The severity of this impact can be mitigated through the number of collection districts established, and by limiting the number of franchises that can be awarded to a single private hauler.

4.2.1.3 Licensing

A licensing system allows existing private haulers to continue to operate within a free enterprise system; however, haulers are required to meet standards imposed by the local government. The haulers would still be responsible for billing customers for collection and disposal services.

The local government would be responsible for establishing uniform performance standards for the haulers. Additionally, the local government would also establish procedures and policies for licensing haulers. The following considerations must be addressed by the local government in order to implement a licensing system:

- Length of License
- Mandatory or Voluntary Collection
- Collection of Recyclables
- Provision of Containers for Refuse and Recyclables
- Collection Frequency (refuse, recyclables, yard waste, white goods, and bulky items)
- Performance Standards (e.g., spillage, litter, noise, equipment)

A. Advantages:

This system allows individuals and commercial establishments to deal with the hauler of their choice. Therefore, small private haulers would be given an equal opportunity to compete with large haulers. In addition to customer choice, the licensing system gives the local government the opportunity for flow control, and facilitates the implementation of new management policies through the requirements of the license.

B. Disadvantages:

Overlapping routes would remain. The private haulers may oppose a licensing system that regulates collection and disposal practices. The local government would be required to establish and enforce standards and licensing procedures and policies.

4.2.1.4 Public Operation

Under this option, collection and hauling services would be provided by local government employees, using equipment owned or leased by the local government. Collection could be made either voluntary or mandatory throughout the local government's jurisdiction. Financing of the system could either be through the tax system, or by direct billing based on the actual cost of providing collection services.

A. Advantages:

This alternative provides the most control for the local government. This can be important for implementation of source reduction and recycling programs, as well as providing uniform quality of service. Theoretically, economies of scale in the procurement of equipment and supplies could be realized by such a large operation. In addition, the public operation does not have to earn a profit or pay taxes, so such costs are not passed on to the consumer.

B. Disadvantages:

In spite of the potential advantages discussed above, studies by Columbia University have found that private collection typically costs 28 to 40 percent less than a comparable public operation. This is attributed to more efficient management and operation characteristic of private industry. A very large capital expenditure would be required by the County to procure the necessary equipment to take over all collection and hauling. A complicated fee structure would be required to reflect the actual costs of collecting and hauling refuse to solid waste disposal facilities. A uniform county-wide fee structure would not be equitable. This option increases government control to the detriment of private enterprise by forcing many local private haulers out of business.

4.2.2 Evaluation of the Existing Collection System

Three of the four collection systems described above are currently employed within Charles County. In the unincorporated areas of Charles County, most municipal waste is collected by private haulers

through a free enterprise system. The remaining residents who do not contract with a private company haul their own waste directly to the landfill. Curbside collection of residential recyclables is accomplished by a licensing system. The incorporated Towns of Indian Head and La Plata operate their own collection systems (public operation). These two municipalities use their own employees and equipment to provide curbside collection of municipal waste and recyclables for their residents. The Town of La Plata uses a private company (BFI) to do their residential curbside collection for recyclables.

The existing free enterprise waste collection system requires minimal involvement and financing by the County. However, due to the unregulated nature of the system and the number of haulers, it will be more difficult to implement modifications to the collection practices that are necessary to meet the goals and objectives of the *Charles County Comprehensive Solid Waste Management Plan*. Volume-based billing for collection services or waste flow control measures is an example. A competitive environment fostered by the free enterprise system should produce the lowest cost for consumers. However, the inefficiencies of overlapping routes may raise operating costs incurred by the haulers which are likely to be passed on to the consumers. Additionally, the use of two separate systems for the collection of municipal waste and recyclables produces extra paper work and confusion for consumers as well as county staff. Based on available information, it appears that the waste collection system in the unincorporated areas could be improved to meet the following objectives:

- Ensure that the County has sufficient control of the collection system so that provisions of the *Charles County Comprehensive Solid Waste Management Plan* can be implemented.

- Ensure that modifications to collection practices will be made in a timely and efficient manner.

- Provide a cost-effective and efficient collection system for the residents of Charles County.

- Reduce the redundancy in the municipal waste and recyclables collection systems.

The licensing system for recyclables collection enables the County to ensure the quality of service by establishing performance standards, and to maintain some control over the types and quantities of recyclables collected. Although residents of Charles County have expressed concern for expanding curbside recyclable collection, the licensing system appears to serve the needs of the county residents. Besides expanding curbside collection services, the County should continuously monitor and evaluate the effectiveness and efficiency of the licensing system compared with franchising or public operation.

Large commercial, industrial, and institutional establishments currently contract directly with private haulers for collection. These establishments often have unique requirements related to collection frequency, containers, and collection hours, which are best addressed by individual contracts; therefore, the existing arrangements for these facilities should be maintained. Alternatively, commercial establishments should have the option of being included in the residential waste or recyclable collection system, if satisfactory service can be provided.

4.3 RECYCLING

Although recycling is not new to the management of solid waste, it is gaining wider acceptance as a viable approach to the solid waste management and disposal problems. State mandated recycling goals and increased public awareness is resulting in an increased amount of material being recovered for recycling. Along with this increase, problems associated with expanding the recycling programs and increased recycling costs are emerging. Although costs associated with recycling are increasing, recycling is considered to be a worthwhile solid waste management tool even at a net loss in order to conserve landfill space.

Recycling issues facing communities today include mandatory versus voluntary programs, flow control, accounting and reporting procedures, compatibility of recycling with other waste management practices and market development. Possible components of a municipal recycling program include curbside collection, drop-off centers, buy-back centers, and processing facilities to recover recyclables from the municipal or rubble waste streams. Each of these components are described in the following sections to provide a basis for evaluating the existing recycling program.

4.3.1 Technology Assessment

4.3.1.1 Curbside Collection

In curbside programs, residents place their recyclables at the curb for collection and subsequent delivery to processing facilities.

A. Operations:

There are several variations of curbside recycling, the three major systems are described below.

1. Resident Sort - Residents segregate target materials by type into separate containers. Typically, three containers are provided to each resident for collection of newspaper, metal cans, glass and plastic.

2. Curbside Sort - In these programs, target materials are placed into a single container, separate from other residential wastes. Collection crews sort the materials at curbside as they place recyclables in the collection vehicle.

3. Commingled - Target materials are placed in a single container, separate from the other residential wastes. The materials are not sorted by collection crews, but placed into the collection vehicle in a mixed state.

When evaluating curbside collection program variations, it should be recognized that differing approaches may affect the level of participation achieved, material processing requirements, the investment required to fund the program, and operational costs. Some programs are structured to pick up refuse and recyclables at the same time; others collect recyclables separately from refuse.

Curbside programs typically target newspaper, glass, and aluminum, but other materials may be included.

Material processing requirements for the curbside programs are dependent upon the collection option selected, and the specific market requirements. Typically, an intermediate processing facility is used to prepare each material for market specifications and to package the material for shipment to the markets. These services may be contracted to private industry or the facility may be operated by the local government.

B. Equipment:

Municipal refuse collection crews and private haulers both have been used to service curbside routes, using everything from flatbed trucks carrying 55 gallon drums to compartmentalized specialty vehicles. The type of vehicle is dependant on availability, the collection route, and the method of collection.

Containers are typically provided to each household for curbside programs. The number and size of container depends on the collection system selected. The containers are typically imprinted with a county, municipal, or recycling logo. Container selection should consider convenience and ease of use from the perspective of the residents and haulers.

C. Costs:

Curbside collection of recyclables could be accomplished by franchising, licensing, or public operation (Section 4.2.1). In general, the public operation of a curbside collection program would be a greater cost to the local government than a franchised program or licensing.

Equipment associated with curbside collection programs include collection vehicles, collection containers, and processing equipment. Operating costs are highly variable and include labor, fuel, supplies, and maintenance. Collection equipment costs can range from $4,000 for a flatbed trailer to $70,000 for a self-loading truck. Labor costs can range from $16 to $125 per ton of material collected.

D. Advantages:

Since curbside programs are based on separating the materials at the source of generation, the materials will be less contaminated and may command higher prices in the marketplace. Curbside programs provide a convenient way for homeowners to recycle.

E. Disadvantages:

Curbside collection programs experience high start-up and operating costs. The success of the curbside collection program is dependent on an ongoing public education program. Curbside collection would not be a cost-effective or efficient method for collecting recyclables in remote, rural areas.

4.3.1.2 Drop-Off Centers

Drop-off center recycling is accomplished through the establishment of stations where recyclable materials can be brought by the public. These centers are generally publicly owned and operated. As with curbside programs, no payment is made for the recyclable materials. Drop-off centers can range from small, mobile operations to permanent processing facilities which accept, process, and store recyclables until they are shipped to market.

A. Operations:

Small drop-off centers can use a number of containers for collection of recyclables. Containers successfully used for drop offs include roll-off drums, 55-gallon drums, and igloo bins which are bell-shaped containers. Material processing requirements are dependent upon the type of drop-off center operation, and are similar to the requirements of the curbside programs. Materials from unmanned centers would typically require a higher level of intermediate processing.

B. Equipment:

Drop-off centers require containers for depositing the recyclables. Collection vehicle requirements are dependent on the type of container. Staffed drop-off centers require office or warehouse facilities and storage containers.

C. Costs:

Costs associated with drop-off centers include the collection containers, transportation of the materials to a central facility, site maintenance, administrative costs of record-keeping, and labor for stations which are staffed. These costs are highly variable depending on the level of sophistication. *The Charles County Recycling Plan* estimated that the cost for the Charles County drop-off centers were in the range of $10 per ton of material processed.

D. Advantages:

Capital and operating costs are lower for drop-off center recycling than curbside programs. Unmanned locations can be located close to population centers and can operate 24 hours per day.

E. Disadvantages:

Drop-off centers are less convenient than curbside collection programs. Vandalism and theft may present problems at drop-off centers. Often, drop-off centers can become unkempt and littered with trash; community or municipal workers must be committed to keep the site clean. Material recovery levels are typically lower than curbside programs. Contamination of recyclable materials is higher than for curbside collection programs.

4.3.1.3 Buy-Back Center

Private buy-back centers operate similarly to drop-off centers; however, individuals are paid for their materials based on current market prices.

A. Operations:

Buy-back centers can be permanent or mobile facilities. Permanent buy-back centers function as an intermediate collection point/processing center taking materials in and distributing them directly to the end processors.

Reverse vending machines are also becoming a popular trend in recycling. The machine weighs, crushes and stores aluminum cans and pays for the material based on current market prices. Reynolds Aluminum sponsors a number of these machines which are located in shopping center parking lots throughout the country.

B. Equipment:

At a minimum, a buy-back center requires scales and containers for weighing and storing the recyclables. Other equipment requirements are dependent on the approach or the combination of approaches used.

C. Costs:

Local governments incur no costs associated with the use of buy-back centers since they are privately owned.

D. Advantages:

Paying the public for recyclables provides an incentive to some who would otherwise not recycle.

E. Disadvantages:

Low material recovery rates are typical of these facilities. Market prices may significantly affect participation.

4.3.1.4 Mixed Waste Processing Facility (MWPF)

A mixed waste processing facility or "dirty MRF" recovers recyclables from the mixed municipal waste stream.

A. Operations and Equipment:

For a typical MWPF, mixed municipal solid waste is dumped onto the tipping floor and pushed onto a below-ground conveyor by a front-end loader. Usually, this waste must go through a bag-breaking

operation, especially if the MWPF is receiving large quantities of residential waste. Bag-breaking is most often performed manually, although some specialized bag-breaking devices are now available.

Screening drums or other special equipment such as air classification units are used to separate the mixed waste stream, generally into two components:

- An "undersize" stream, which consists mostly of fine particles fewer than one or two inches in length. This stream contains fine aggregate materials (e.g., glass, stones, etc.) and compostables, such as soil and food particles.

- An "oversize" stream, which contains recyclable food and beverage containers, paper, film, plastic, and other large objects.

One of the primary objectives of this process is to separate the compostable components of the waste stream from the larger particles of paper and plastic that are more useful as fuel. Size classification can also help improve hand-sorting efficiency. Since the finer material has already been removed, sorters picking materials from the oversize fraction do not have to dig through as much material to reach and pick out the recyclables.

The first recyclable item that is typically removed is ferrous metal. The overhead electromagnetic separator is the device used almost universally in the industry. These separators, which are manufactured by a number of companies, consist of an electromagnet surrounded by a moving conveyor belt. The electromagnet attracts ferrous metals which "adhere" to the magnetic separator belt. The separator belt then dumps the metal onto another conveyor which transports it to crushing equipment or directly loads it into trucks for shipment to market.

Since magnetic separators are not 100 percent efficient, some facilities station hand-sorters before or after the magnet to increase the amount of ferrous captured.

After the magnetic separation process, the remaining waste often proceeds onto hand-sorting conveyors. These are slow-moving conveyors, located 10 to 15 feet above floor level. The sorters stand on elevated platforms that are adjacent to the conveyors and pick recyclable materials, which they then drop into chutes. The chutes convey the material to one of the following:

- Concrete storage bunkers, located underneath the sorting conveyors.

- Processing equipment (e.g., glass crushers, aluminum can flatteners, or plastics granulators).

- Other conveyors, which transport the recyclables to processing equipment or storage areas.

Very often, MWPFs will receive loads of waste that are dry and contain primarily paper materials from commercial generators. The number of loads containing primarily dry material would be affected by the existence of programs that source-separate cardboard and paper. These dry paper loads can be baled and shipped to market after a minimal amount of sorting to remove contaminants.

Such sorting can be done on the tipping floor (in the manner of the "dump and pick" MWPF). In other words, these loads do not have to be processed through the entire sorting system.

Once they are baled, crushed, or otherwise processed, recyclables are either stored within the building or loaded directly into waiting trucks for shipment to markets.

The MWPF may further process non-recovered waste. Non-recovered waste which comes off the sorting conveyor may be shredded to make it easier to burn or compost. The loose, fluff-like material that emerges from the shredder is directed to an on-site fuel pelletization or composting process or loaded into transfer trailers for shipment to off-site fuel production or composting facilities.

B. Costs:

Capital costs for a MWPF are highly variable dependent on the level of mechanization and sophistication of the facility, as well as land acquisition and site development. A typical capital cost range is $20,000 to $30,000 per ton of daily capacity, exclusive of land acquisition. For Charles County, capital cost for a 300 ton per day MWPF are estimated to range from $6 million to $9 million. Operation and maintenance costs are estimated to range from $40 to $60 per ton of municipal waste processed, exclusive of revenues gained from marketing recycled materials.

C. Advantages:

The primary advantage of a MWPF is the convenience to residents and business; therefore, there is no need to segregate wastes at the source. This typically results in higher recovery rates for recyclables.

D. Disadvantages:

Capital and operations costs are significantly higher than for a Material Recovery Facility (MRF) (Section 4.3.1.5). Contamination of materials is a problem, resulting in lower quality recyclables that are more difficult to market. The potential exists for environmental impacts from odors, aesthetics, and contaminated runoff from the facility.

4.3.1.5 Material Recovery Facility (MRF)

A material recovery facility or "clean MRF" processes recyclables that have been source-separated from the waste stream.

A. Operations and Equipment:

Material recovery facilities receive and process recyclables that have been source-separated from the waste stream. They vary in level of sophistication from "recyclable transfer stations" to highly mechanized processing plants for commingled recyclables. Equipment requirements are based upon the level of separation of the incoming recyclables and the type and quality of recycled materials required. Most MRFs will include concrete storage bunkers, compaction and baling equipment.

Sophisticated MRFs can include conveyer lines, screening and picking stations, electromagnetic separators, and air classifiers as previously described for the MWPF.

B. Costs:

As with the MWPF, capital and operations costs vary over a wide range, dependent on the level of technology employed by the facility. A typical capital cost range is $40,000 to $70,000 per ton of daily capacity. For Charles County, capital costs for a 20-ton-per-day MRF are estimated to range from $1.6 million to $2.8 million, exclusive of land acquisition. Operations and maintenance costs, can range from $20 to $60 per ton, exclusive of revenues gained from marketing recycled materials.

C. Advantages:

MRF's generally produce a higher quality of recyclable materials than a MWPF; therefore, capital and operations costs are significantly lower. There is better control over the types and sources of waste that is accepted. In addition, environmental impacts, including odors, are less of a concern than with a MWPF.

D. Disadvantages:

In order to utilize the MRF concept, residents and businesses must separate recyclables from their waste stream prior to collection. This typically results in a lower participation and recovery rate than for the MWPF.

4.3.1.6 Rubble Material Recovery Facility (MRF)

A large portion of land-clearing, construction, and demolition debris is recyclable. A few examples of recyclable rubble materials include wood, paper, concrete, asphalt, gypsum wallboard, and glass. These wastes are most often mixed when received from project sites, creating an obstacle for recycling. Some separation of wastes can be accomplished at the job site by encouraging contractors to segregate major recyclable components in separate disposal containers. However, segregation of wastes at demolition sites is an expensive, labor-intensive process. Alternatively, a central rubble MRF can be established to separate and process the recyclable components of the rubble waste stream.

A. Operations and Equipment:

Rubble is not as amenable to the highly mechanized separation technology used in some municipal waste MRFs. Since rubble waste is generally large, bulky, and heavy, sorting equipment is limited to front-end loaders, dozers, and human labor. Processing equipment can include grinders, balers, crushers, shredders, and chippers depending on the level of processing at the facility.

Wood waste makes up a significant portion of the rubble, including pallets, stumps, and brush from land-clearing operations. Large tub grinders and wood chippers are often used to reduce these wastes to wood chips for marketing. Chips can be marketed as fuel, mulch, and animal bedding. Depending

on the market, painted or treated wood products may be excluded from the chipping operation. In addition, magnetic separation of metal wastes (e.g., nails from pallets) is often used.
Paper waste is primarily corrugated materials which can be easily baled and readily marketed after separation from the rubble waste stream. Contaminated and plastic coated cardboard must be excluded. Recycled paper products are made with the recovered paper waste.

Asphalt roofing waste has a high resale value due to the high percentage of petroleum; however, recycling has not been widespread due to problems associated with the removal of contaminants (e.g., paper backing, stone, gutter scraps, and nails). Sorted shingles and aggregate are mixed, reduced in volume, and passed over magnets to remove metals. The recovered asphalt can be used to manufacture paving products.

Metal waste is separated into the various types (e.g., ferrous, aluminum, copper) and marketed to scrap metal dealers. The scrap metal is used to manufacture new metal products.

The volume of concrete in rubble is highly variable. Waste concrete can be crushed and then passed over magnets to remove rebar and wire which is marketed to scrap metal dealers.

Crushed concrete can be used as aggregate for septic fields, driveways, pipe bedding material, and landfill cover.

Plastic materials are shredded or crushed, depending on the market, and used to manufacture new plastic products.

Earth materials such as soil and yard waste can be used as landfill cover or sent to a yard waste composting facility.

Other products recovered from the rubble waste include the following:

- Bricks - Crushed and used as aggregate or ornamental stone.
- Carpet - Landfill cover.
- Glass - Ground and used to manufacture fiberglass insulation, for sand blasting, or asphalt aggregate.
- Gypsum Wallboard - Crushed and used as agricultural gypsum, wallboard, or cat litter.
- Porcelain - Crushed and used as concrete aggregate.
- Tires - Shredded and used in roadways, to manufacture rubber products (e.g., bumpers, mudflaps, car mats, shoes, gloves).

B. Costs:

Typical capital costs for a rubble MRF ranges from $5,000 to $30,000 per ton of daily capacity, exclusive of land acquisition. For Charles County, the capital cost for a 250 ton per day rubble MRF is estimated to range from $1.2 to $7.5 million. Operation and maintenance costs are estimated to range from $20 to $60 per ton of rubble processed, exclusive of revenues gained from marketing processed materials.

C. Advantages:

Rubble recycling reduces the amount of land required for landfills, and extends the life of existing facilities. Rubble recycling provides a beneficial use for materials which would otherwise be considered waste.

D. Disadvantages:

Depending on available markets, costs for this technology will typically exceed costs for land filling. Depending upon location and adjacent land use there may be adverse impacts from truck traffic and noise.

4.3.1.7 Commercial Recycling

Recycling is provided in the commercial sector primarily through private industry contractors who collect and market recyclables for large- and small-scale businesses. Many smaller businesses collect material and take it to publicly operated recycling centers to minimize costs. Larger businesses and shopping centers often ship recyclables directly to markets.

4.3.2 Evaluation of the Existing Recycling Program

During 1999, Charles County achieved a recycling rate of 29 percent (including yard waste - Section 4.4). Reports show that the recycling program has emerged from one that was primarily dependant on the commercial sector of the community to one which has increased recycling opportunities for the residential sector. The Charles County recycling program consists of five areas:

1. Collection - A combination of curbside collection and citizen drop-off locations are currently used to sort, separate and collect newspaper, cardboard, textiles, glass, metals, plastics, white goods, used oil and antifreeze, yard waste, and tires. There is one buy-back center located in Charles County (Waldorf Metals). Expansion of the recycling program continues with over 25,000 households receiving service.

2. Processing - The County operates a recycling consolidation facility and a yard waste composting facility at the Charles County Landfill. The County uses the composted material on the public grounds and athletic fields and offers free mulch, made from recycled yard waste collected within the County, to the public.

3. Public Education - Charles County conducts a public education program aimed at community leaders, business organizations, tourist promotion groups, large commercial generators and residents, to promote participation in the recycling effort.

4. Administrative - Administrative programs have been expanded to include a recycling supervisor and educator. Training programs for landfill and drop-off center staff as well as administrative and supervisory personnel are regularly conducted. Training programs focus on general education about recycling and the County's recycling program.

5. Market - The County continues to monitor the market for recyclables to ensure the best price. Factors including transportation, traffic, processors acceptance standards, and the amount of material available are all evaluated in deciding the best possible market.

The existing recycling program has shown significant results, increasing the percentage of the waste stream recycled from 15 percent in 1992 to 29 percent in 1999. In 1999, approximately 36,266 tons of recyclables were recovered in Charles County. Approximately 44 percent of this total was obtained from the residential sector (recyclables and yard waste) and 56 percent from the commercial sector.

Rubble waste is not considered an "eligible waste" under the Maryland Recycling Act, and as such, recycling rubble would not count toward the County's recycling rate. However, Charles County will evaluate the options for a rubble processing facility to process the rubble and reduce the amount and/or volume of rubble landfilled.

The Tri-County Council for Southern Maryland Regional Task Force prepared a Report and Recommendations in October 1993. This report discusses regional solid waste management solutions for Calvert, Charles, and St. Mary's Counties. The following regional opportunities were recommended as long-term solutions:

- Cooperative Marketing of Recyclables
- Regional MRF
- Cooperative Public Education Programs
- Cooperative Procurement Policies

Charles County will continue with an aggressive recycling program to recycle as much of the eligible waste generated in the County as possible.

4.4 YARD WASTE COMPOSTING

Yard waste composting is becoming an increasingly popular waste management option as communities look for ways to divert this portion of the waste stream from landfills. Composting is a simple, low-cost operation which can handle large portions of the waste stream and significantly benefit other waste management operations environmentally and economically.

The availability of and access to outlets which will use or purchase compost is fundamental in determining composting program success. Typically markets include farms, nurseries, municipal operations (parks and landfills). Although compost can generate revenue, the revenue is not likely to exceed the cost of collecting, processing, and distributing the compost. However, reduced disposal costs and environmental benefits of are attractive features of yard waste composting.

4.4.1 Technology Assessment

Yard waste compost is a material which has undergone a biological decomposition of organic matter and is stabilized to the stage of being beneficial to plant growth. Composted yard waste products can

be generated for use as a mulch, soil amendment, topsoil, or potting soil. A proper balance of environmental conditions is required to ensure successful composting. The following four factors are critical to the composting process:

- Moisture - Too much or too little may slow down the composting process.
- Oxygen - Required for the bacteria to decompose the organic material.
- Nutrients (nitrogen-to-carbon ratio) - A balance of thirty parts carbon to one part nitrogen promotes efficient composting (e.g., grass clippings have a higher nitrogen-to-carbon ratio than do leaves).
- Temperature - Self generated heat from the bio-decomposition of the waste material naturally rises as the action of the microorganisms increase. This increase has the positive effect of enhancing decomposition and destroying weed seeds that may be present in the material being composted.

Types of yard waste includes leaves, wood, and green waste such as grass clippings, sod, hay, straw, weeds, brush, and hedge clippings. Leaves and wood generally decompose slower than green waste. Wood waste is the slowest to compost because of its density and its high carbon content and low nitrogen content. Green waste is an excellent source of nitrogen and moisture for the composting process. When mixed with leaves and woody material which lack these ingredients, the overall process is enhanced.

The types of compost from yard waste includes mulch, soil amendments, and soil mediums. Mulch is partially decomposed wood waste which can be used as a barrier to retain moisture and insulation to protect plants. Types of mulch includes bark, wood chips and shredded wood. Bark is generally ground or broken up into small pieces rather than chunks; wood chips are generally derived from wood/brush chipping equipment; shredded mulch is produced by running woody material through a tub grinder and is then composted to stabilize the material.

Soil amendments consist of compost that is mixed with soil to improve the physical and nutrient characteristics of the soil. Examples of soil amendments include humus and screened compost. Humus is a dark, rich, well-decomposed organic material; screened compost is the peat-like, fine portion of composting material that has been screened from large, woody particles.

Soil mediums are typically a mixture of soil amendments such as compost, sand, and vermiculite to produce planting mixtures and potting soils.

4.4.1.1 Operations and Equipment

Yard waste composting technologies range from small scale backyard systems to larger scale systems for processing waste within a regional area.

A. Backyard Composting

The type of backyard system is only limited by the imagination of the homeowner. Systems include the following:

- Backyard windrows - elongated piles constructed by layering.
- Cylindrical pens - using woven wire to form a cylindrical pen and layering materials within the pen.
- Perforated steel drums partially filled with compostable material. The drum is rolled to provide for aeration of the compost.

B. Low-Level Technology for Large Scale Operations

Process involves forming large windrows (12 feet high by 24 feet wide) that are turned once a year with front-end loaders. Compost is ready for use in approximately 1 to 2 years. This technology requires little attention and is relatively inexpensive. The space required for this technology is also minimal in comparison to the other technologies. However, odor is a common characteristic due to the infrequent turning.

C. Mid-level Technology for Large Scale Operations

Process involves medium size piles (6 to 7 feet high by 15 to 18 feet wide). The composting process is completed in approximately 16 to 18 months. Piles are turned more frequently, hence the odor problem occurs less frequently.

D. High-Level Technology for Large Scale Operations

A multi-step control approach involving grinding, shredding, and frequent windrow-turning. Additional process control is provided through moisture addition and temperature monitoring. Compost is ready for use in 3 to 6 months. Capital and initial operating costs are higher due to the additional shredding, grinding, mixing, and screening equipment.

4.4.1.2 Costs

The planning of yard waste composting programs must take into consideration four cost components:

- Capital cost of processing facilities and possibly transfer stations.
- Annual site operation and maintenance costs.
- Annual yard waste collection costs.
- Annual product marketing costs.

The capital cost of the compost processing facilities will vary widely depending on the sophistication of the process used, the amount of waste received, and the type of waste received. A careful evaluation of options versus cost implications is required when planning and financing such facilities.

Site operational costs are more predictable and these typically range from $2 to $5 per cubic yard of material produced, exclusive of collection and marketing costs. Generally, the greatest cost associated with yard waste management arises from waste collection. Curbside pick-up can represent as much as 75 to 80 percent of total project costs. Typical collection costs can range from $8 to $20 per cubic yard of waste.

Marketing costs will vary and will be a function of the demand for the material, influence of competing products, quality of the material produced, and the desired revenue. Marketing costs are minimal when compost products are used by government agencies or when "giveaway" programs with citizens consume all of the product. If revenue is derived from product sales, increasing levels of marketing are required. A good rule of thumb is that wholesale "bulk" marketing results in the high-volume sales and low revenue; whereas, wholesale "bagged" marketing results in low volume but high revenue.

4.4.1.3 Advantages

Composting is a low-cost operation and saves valuable landfill space. Composting has minimal operation and maintenance requirements. The final product is useable and is potentially marketable.

4.4.1.4 Disadvantages

Composting has the potential for odor problems. Markets for compost may vary and excess compost may require a separate storage area.

4.4.2 Evaluation of Existing Yard Waste Composting Program

Charles County has composted yard waste since April 1992. In 1999, 8,145 tons of yard and wood waste was processed (679 tons per month).

The composting site, formerly located off Radio Station Road in La Plata, is now located at the Charles County Sanitary Landfill. The composting area occupies a portion of what is destined to be Cell number 2 of the landfill. The yard waste delivered to the site is de-bagged and composted in “windrows” on the paved pad. The County uses a composting process which is completed in approximately 150 days. The compost is used on County owned athletic fields and public areas.

The County uses a windrow turner and screen to maintain the compost windrows and a tub grinder is used to convert brush and wood waste into mulch.

Yard waste is estimated to comprise approximately 14 percent of the residential waste steam and 5

percent of the eligible commercial/industrial and institutional waste steam. In total, yard waste represents approximately 9 percent of the municipal waste stream in Charles County. At current composting rates for 1999, the 8,145 tons of composted material represents approximately 27 percent of the estimated residential yard waste generated. It should be noted that the yard waste composting percentages are based on estimated waste composition. A waste composition study will be recommended (Chapter 5) to provide information for assessing the validity of these percentages and for detailed planning of collection and processing systems that will be necessary. When the characterization is complete, a more definite assessment of the efficiency of the existing system can be made.

Alternatives available to further increase the yard waste composting rate include increasing the participation from the commercial sector and expanding the collection system to the unincorporated areas of the County. Additionally, the composting site has been located on a site which easily affords expansion to accommodate the increased throughput.

Another option presented by the Regional Solid Waste Management Task Force is the development of a cooperative yard waste composting program for Calvert, Charles, and St. Mary's Counties.

4.5 SOLID WASTE COMPOSTING

Municipal Solid Waste (MSW) composting has been practiced for many decades around the world. In the United States, it has met with limited success because of high cost, production odors, faulty technology, and poor product quality. In the past decade, however, interest in solid waste composting has increased in the United States, and more facilities are being built. Typically, the economics of solid waste composting require high landfill tipping fees to justify the high cost of capital, operation, maintenance, and product marketing. Solid waste composting is often used to further process residual wastes generated by a Municipal Waste Processing Facility.

About 70 to 75 percent of a typical solid waste stream consists of newspaper, corrugated, mixed paper, food and yard wastes which can be composted. The remaining 25 to 30 percent must be either landfilled, recycled, or processed by some other method. The composted material may be used as landfill cover material, for agricultural purposes, or for landscaping. The market for composted municipal solid waste within Charles County has not been investigated. In the event that a MSW composting facility is considered for Charles County, the determination of markets for the composted material should be a priority.

4.5.1 Technology Assessment

There are several composting technologies available today; however, the general process involves mechanical preparation of the incoming waste, materials recovery (in some cases), active composting, curing, and product screening.

4.5.1.1 Operations and Equipment

The composting processes considered potentially applicable for Charles County are the windrow-

with-forced air aeration (WWFA), aerated static pile (ASP), horizontal silo, and in-vessel. When used for MSW, all of these processes normally include pre-processing, post processing, and curing stages. Despite having different digestion processes, all systems have three distinct phases; namely, pre-processing, composting or digestion, and post-processing. The specific design of the composting facility and equipment used depends on the following:

- The quantity and composition of the waste stream being processed.
- The desired quality of the end-product.
- The desired recovery levels of auxiliary products such as recyclables and fuel products.
- The site conditions and proximity of the plant to its neighbors.

In particular, the degree of pre- and post-processing depends on the market for the final compost product. If it will be used as landfill cover, non-compostable materials may be allowed to remain in the compost. If it will be used as a soil conditioner for landscaping, most or all inorganic material will need to be removed. The pre-processing, digestion and post-processing systems are described below.

A. Pre-Processing:

Purely organic waste streams, such as yard wastes, food waste or agricultural wastes require little or no pre-processing. However, MSW is normally more heterogenous in composition and will contain a large percentage of inorganic material. The objective of pre-processing is to remove inorganic materials and recyclables from the waste stream and isolate the organic fraction for composting.

Pre-processing at MSW composting facilities include the following processes:

- Removal of bulky, non-processible wastes.
- Size reduction (shredding and bag-breaking).
- Size classification (screening, air separation, density separation).
- Magnetic separation and recovery of ferrous metals.

Often water and/or sewage sludge is added to the organic fraction of the waste stream to promote decomposition of the material into compost. Water must be added since MSW does not contain a sufficient water content for rapid and efficient composting to occur. Sludge is an optional ingredient that can increase the nitrogen content of the MSW, thus maintaining a suitable carbon/nitrogen ratio for composting. Forced air is required for the completion of the composting process. Often a biofilter consisting of a bed of mature compost or bark chips, 3 to 6 feet thick, is used to filter the exhaust air.

Shredding is a key element of the pre-processing procedure. Shredded waste generally composts more quickly than non-shredded waste and tends to form a more uniform end-product.

B. Digestion:

Several methods are commonly used to digest or compost MSW, including the following:

1. The WWFA process is performed in a large, enclosed hanger with concrete floors. The incoming waste stream is deposited into windrows (long, piled rows) which are then routinely and strategically moved by windrow turners so that the completed compost is located at an outermost windrow by the end of the process. The windrow turners turn and rebuild the windrows by picking up the material with a screw like conveyor and transferring it to an adjacent windrow. Water is added to the material as it is being turned to maintain the materials optimum moisture content for effective composting. The WWFA process uses negative forced aeration to activate the biological digestion process. This process takes approximately 60 days.

2. The ASP process is similar to the WWFA process, except that the piles are not turned for approximately 2 weeks. During this time, anaerobic decomposition of the material occurs and negative forced aeration occurs. The exhaust air is processed through a biofilter prior to release into the ambient atmosphere. The measurement and monitoring of oxygen and carbon dioxide concentrations within the piles alerts the operators when the majority of the material has begun to decompose aerobically. At this occurrence, the forced air is reversed (air is blown into the process). The material is then sent through a trommel where oversized elements are removed. The pile is then processed again using the ASP method for approximately 4 weeks. After the second processing, the material is placed outdoors into a static pile for stabilizing the material.

3. In the horizontal silo system, shredded waste from the pre-processing area is placed into the concrete silos by conveyor belts. The silos are usually between 5 and 15 feet wide, 4 and 8 feet high, and may be over 200 feet in length. The entire composting area is covered by a roof to prevent rain water from entering the piles and subsequently leaching out. Agitation is provided by a turning machine which is mounted on the silo walls. Forced aeration which may be activated by temperature is supplied to the silos. Often the exhaust air from the silos is conveyed through a biofilter to reduce odors.

4. In-vessel systems have a unique vessel design, consisting of rotating drums and stationary domes. The rotating drums introduce waste into the digester after the pre-processing procedure. In some cases, the drums are equipped with metal spikes or bars to assist in the breaking of garbage bags and in agitating the waste to quicken the degradation process.

   The drums are usually between 10 and 15 feet in diameter and range from 80 to 150 feet in length. The drums may contain a single chamber or be divided into multiple chambers, with the waste being transferred from one chamber by screw conveyors. The MSW water, and a nitrogen source are added to the drum which is rotated for anywhere between 12 hours to 3

days. Forced aeration is also provided to the drums.

Dome reactors are usually constructed of concrete/steel and range from 20 to 150 feet in diameter. MSW is piled to a depth of 6 to 10 feet in the dome, and is placed and removed from the dome with a screw conveyor. Aeration is activated by temperature sensors located in the waste. The material remains inside the dome for a period ranging from 3 days to 2 weeks.

In-vessel systems generally utilize a secondary digestion process to promote further decomposition and stabilization of the raw compost. This process will consist of an aerated static pile, windrows, horizontal silos, or even a second vessel. In most systems, the material will remain in the secondary digestion system for a period of 3 weeks.

C. Curing and Post-Processing:

In many systems, compost emerging from the horizontal silos or digester vessels must be further stabilized or cured. This is necessary because when compost is applied to the land before the compost process has completely ceased, it may chemically remove essential nutrients, such as nitrogen, from the soil.

Like pre-processing, post-processing operations concentrate on removing inorganic material from the compost. These contaminants include glass, grit, paper, plastic, and textiles. The methods for extracting these materials include:

- Screening
- Magnetic Separation
- Fluidized-Bed "Destoners" (removes paper, plastics, glass, grit, and rocks)

The residuals generated from this process may be further processed and either landfilled or recovered for fuel.

4.5.1.2 Costs

Typical costs associated with MSW composting include capital costs and operation and maintenance costs. Depending on the process selected and the quality of the end product, these costs can vary greatly. Costs for a municipal solid waste composting facility, excluding land, range from $55,000 to $75,000 per design ton per day.

4.5.1.3 Advantages

Composting has the potential to result in large-scale weight and volume reduction of the MSW stream. Depending on the composition of the input waste stream and the process used, a volume reduction of between 55 and 70 percent could be achieved, thus extending the life of the existing landfill significantly.

MSW composting systems are able to accept yard waste directly into the waste process. In fact, the addition of the yard waste may improve the efficiency of the process because of its high nitrogen and moisture content.

4.5.1.4 Disadvantages

Charles County's municipal waste stream is projected to produce approximately 300 tons per day in 2004 and 334 tons per day in 2010. Substantial operating costs are attributed to MSW composting facility with a capacity this large.

For compost used in agricultural or landscaping applications, the risks posted by heavy metals are not well understood. This has prompted several states, including Maryland, to investigate stringent standards regarding heavy metals content of the compost and permissible rates of application to the land.

A number of operating facilities have had serious problems controlling odor, arousing complaints from neighbors and sometimes compelling the facilities to shut down or install expensive odor control systems. The facility must utilize effective odor control equipment and techniques, such as aeration systems, exhaust air treatment (biofilters and/or scrubbers), enclosed digestion buildings, and frequent turning/agitation of the decomposing material.

The financial community is aware of the problems composting facilities are having securing necessary state approvals for marketing their end-product and in obtaining reliable customer outlets. Any MSW composting project that wishes to be financed will have to demonstrate a sound outlet for the compost or a well-conceived marketing plan with realistic, achievable goals.

4.5.2 Feasibility Evaluation

Because of the uncertainties and problems currently associated with MSW composting, it is not recommended as a suitable solid waste management technique for Charles County during the 10-year planning period for this Plan.

4.6 MUNICIPAL WASTE COMBUSTION AND WASTE TO ENERGY

Before 1970, municipal waste incinerators in the United States were refractory-lined units that functioned solely to reduce the volume of waste destined for disposal. Over the past several decades, the vast majority of incinerators or "waste-to-energy" facilities also produced steam and/or electricity through the combustion process. Waterwall combustion chambers are used to generate steam that is either sold directly, or is used to drive turbines to generate electricity.

4.6.1 Technology Assessment

There are two types of facilities used for the incineration of municipal solid waste; a mass-burn facility and a refuse derived fuel facility. Both types of facilities are described in the following sections.

4.6.1.1 Mass-Burn Facility Operations and Equipment

Mass-burn facilities can be constructed and operated with or without energy recovery. The singular identifying feature of mass-burn facilities is they do not process incoming waste prior to combustion. Incoming waste is dumped into a tipping pit and fed into a charging hopper using a crane or conveyor. The crane removes bulky and non-processible objects (white goods, sofas, tires, etc.) and sets them aside for recycling or landfill disposal. The remaining waste is transferred from the pit into the furnace by a horizontal moving ram.

The furnace is designed to continually agitate the waste as it burns. Waste particles are very heterogenous in size and agitation is required so that complete or near-complete combustion is achieved. Within the furnace, the waste tumbles down a series of stepped grates, and is shoved along by horizontal rams to maximize the rolling action. Controlled quantities of air must also be supplied to the furnace to support combustion.

In a waste-to-energy mass-burn facility, the hot flue gases created by the combustion process rise upward through the furnace into the boiler, where they transfer heat to water-filled tubes. In many facilities, the tubes are located in the boiler walls, a configuration aptly known as a waterwall boiler. Both stationary and rotating waterwall units are commercially available, though stationary units are much more common. One key advantage of the waterwall design is that by absorbing the heat created, the tubes help protect the boiler walls from thermal destructive effects such as slagging. As a result, less excess air is needed for cooling the furnace (too much excess air generally will lower a boiler's energy production efficiency).

After passing through the boiler, the flue gases travel through a superheater, where they increase the energy content of a portion of the steam previously manufactured by the boiler. They are then directed through air pollution control equipment, such as scrubbers and fabric filter baghouses, and discharged to the atmosphere via a stack.

The steam produced in the boiler and superheater can be used for industrial process purposes, central steam heating, or to generate electricity by channeling it through a turbine. The turbine-generator and steam circulation systems employed at mass-burn facilities are identical to those used at fossil fuel power plants. The quantities of steam and/or electricity produced largely depend on the waste capacity of the facility.

As in any combustion process, a solid ash residue is produced. Bottom ash is formed by combusted material that exists at the bottom of the furnace chamber, while fly ash consists of ash and other solids captured from the boiler and air pollution control equipment. Fly ash often is treated by processing it through a pug mill, where it is wetted and reduced in size. Bottom ash may be passed under a magnetic separator and through a trommel screen to recover ferrous and non-ferrous metals for recycling. The ash streams may either be combined prior to shipping them to a landfill or shipped and disposed independent of each other.

4.6.1.2 Refuse Derived Fuel Facility Operations and Equipment

The fuel properties of mixed municipal solid waste can be improved by reducing it to particles less than six inches in length and removing the materials that have little or no heat value. This is precisely what refuse derived fuel (RDF) processing facilities are designed to accomplish. An auxiliary function is the recovery of recyclables, although modern RDF facilities do not sort out nearly as much recyclable material as mixed waste processing or even municipal solid waste composting facilities.

Municipal solid waste is dumped onto a tipping floor where front-end loaders and dozers compact the waste and push it onto in-feed conveyors. Bulky and non-processible items are segregated either on the tipping floor or are lifted off the in-feed conveyor by cranes at designated picking stations. The bulk of the waste enters a series of shredding and screening machines, which convert between 60 and 80 percent of it to loose RDF. Equipment utilized in the processing lines often consists of the following:

- Low-speed shredders of flail mills for breaking open bags of waste.

- High-speed hammermill shredders which use rotating hammers to drive waste through fixed grates, thus pulverizing it to the size of the grate openings.

- Overhead magnetic separators, which recover ferrous metals. They either may be of the belt variety (like those at MRFs), or they may be rotating beltless drums which function in essentially the same manner as the belt separators.

- Trommel screens, similar to those used in the pre-processing areas of municipal solid waste composting facilities.

- Steel-belt and rubber-belt conveyors, which transfer the waste between the different pieces of processing equipment.

The processed RDF consists of paper, plastic, and other particles one to six inches in length. Fine particles (those under one inch) typically consist of non-combustibles such as dirt, food waste, and broken glass. This material is screened out by the trommels and deposited on conveyors, which load it into trailers for shipment to landfills. Ferrous metal is also collected on separate conveyors and transferred into waiting trailers for shipment to scrap markets.

After processing, the RDF normally is stored on a second enclosed tipping floor. This is an obvious difference from mass-burn systems, where the fuel product (raw waste) is stored in a pit. The RDF is pushed onto in-feed conveyors by front-end loaders and enters a feeding system, which may be a complicated series of vibrating screens, auger conveyors, and pneumatic feeders. The purpose of this system is to carefully regulate the flow of RDF into the combustion chamber, thus maximizing combustion efficiency.

The furnaces and waterwall boilers utilized at RDF combustion facilities are similar to those at mass-burn plants. However, in RDF combustion systems, much more of the fuel burns in suspension (combusts while airborne in the furnace), as opposed to on the grates. In addition, RDF boilers do not need to accommodate the larger, heavier objects from the waste stream since

- RDF boilers are generally smaller than those at mass-burn facilities.
- Only one set of moving grates is typically employed (i.e., there is no stepped series of grates).
- The grates themselves are of less-rugged construction than those used in mass-burn systems.

Steam generation, air pollution control, and ash handling systems are similar in design to those used at mass-burn facilities.

There are a number of other general differences between RDF and mass-burn facilities:

- Because some components of the waste stream with poorer heat value and combustion properties are removed during pre-processing, RDF facility will produce approximately 5 percent more energy than an equivalently-sized mass-burn facility.
- Because RDF processing is a more mechanically complex process, RDF systems often exhibit lower availability than mass-burn systems. As with mixed waste processing, very complex processing lines tend to have more mechanical shutdowns and lower overall availability.
- Due to the relative complexity of the pre-processing systems, RDF systems require operators with greater skill and experience.
- Because processed RDF is stored on a separate tipping floor, a larger site is required than for a mass-burn facility.
- RDF facilities may send a greater percentage of their incoming waste stream to landfills, since they screen out the finer materials with poor combustion properties. In a mass-burn system, much of this material will come out in the ash, but some of it may burn and not have to be landfilled.

4.6.1.3 Costs

Capital costs for a waste-to-energy plant, as well as operation and maintenance costs, are generally high and vary greatly depending on the type of facility. Construction costs alone may range from $50,000,000 to $100,000,000 per 500 tons of rated daily capacity.

4.6.1.4 Advantages

The primary environmental benefit of waste-to-energy facilities is the conservation of natural

resources. Solid waste that would otherwise end up in a landfill is used to generate energy, thus conserving fossil fuels.

After combustion, the volume of material requiring land disposal is reduced by 85 to 90 percent.

Both mass-burn and RDF systems are commercially proven, as evidenced by the number of commercial-scale facilities in operation and their cumulative years of operating experience. Particularly for mass-burn systems, there are multiple vendors with strong business positions and significant amounts of construction and operational experience.

Waste-to-energy facilities are net energy producers, although they cannot produce electricity on the scale of a normal-sized fossil-fired power plant. Revenues from energy sales usually cover a portion of the plant's operating expenses and debt service.

Improvements in air pollution control technology have resulted in significant reductions in the quantities of major air pollutants emitted from waste-to-energy facilities.

4.6.1.5 Disadvantages

The primary environmental issues associated with municipal waste combustion are air pollution and ash disposal. Because of these issues, there is often significant public opposition to the operation of municipal waste combustion facilities.

Waste-to-energy facilities are difficult to site and permit; the amount of time required for siting, permitting, and construction is considerably greater than for other waste processing and disposal technologies.

The capital cost of a waste-to-energy facility is substantially greater than for any other waste disposal alternative considered in this Plan.

The Clean Air Act, Title 5, holds strict parameters for any facility that discharges emissions into the air. In addition, the U.S. Environmental Protection Agency requires that the ash material from an incinerator facility must pass a TLCP test to characterize the ash prior to disposal in a landfill facility. If more stringent air emissions standards are promulgated, and ash is classified as hazardous waste under Resource Conservation and Recovery Act reauthorization, capital and operating costs for a typical plant could increase appreciably.

4.6.2 Feasibility Evaluation

Because there is no energy recovery or other beneficial by-product, municipal waste combustion is not recommended as a suitable technology for Charles County. A combustion process which produces energy is not recommended as a short-term objective for Charles County. However, as identified in the January 1994 report from the Regional Solid Waste Management Task Force, a regional waste-to-energy facility is recommended as a regional long-term waste management technology.

4.7 LAND DISPOSAL - MUNICIPAL WASTE

Landfilling will remain an important component of every integrated solid waste management program. Source reduction, recycling, and resource recovery can significantly reduce, but not eliminate, the need for landfills.

4.7.1 Technology Assessment

A municipal waste landfill contains compacted solid waste within an enclosed lined area to minimize potential adverse environmental impacts. All landfills within Maryland must satisfy requirements established for construction, operation, maintenance, expansion, modification, and closure as stipulated by MDE.

Despite environmental and public concerns associated with landfills, every integrated waste management system must have access to a landfill. Recycling, composting, and material separation and removal can divert significant portions of the waste stream from final disposal, but not all materials are recyclable. Combustion of solid waste significantly reduces waste volumes, but even the most advanced facilities must dispose of ash residues. Also, waste may need to be disposed of during plant shutdowns.

Today, municipal waste landfills are significantly more sophisticated than the open dumps of the past. "State-of-the-art" landfills use a variety of specific technologies and practices including:

- Liner Systems
- Leachate Collection and Removal Systems
- Leachate Treatment and Disposal Systems
- Closure Techniques (i.e., reducing the amount of leachate generation)
- Gas Collection, Venting/Reuse, and Monitoring Systems
- Provisions for Closure and Post-Closure Care and Maintenance
- Ground and Surface Water Monitoring Systems
- Monitoring and Control of Materials Entering the Site

4.7.1.1 Costs

Municipal sanitary landfill construction and operations costs have increased dramatically over the past decade. Factors contributing to the rising landfill costs include:

- Stricter, more comprehensive environmental regulations.
- Increased public awareness and demand for environmental protection.
- Time delays, engineering and legal costs in obtaining permits.
- Design of remediation measures at the existing landfill.
- Property costs for new landfill sites.

Typical costs for landfills include predevelopment, land acquisition, landfill development, construction, operating, and closure and post-closure costs. These costs vary over a wide range.

Pre-development costs are associated with site selection, investigation, and permitting costs. Land costs vary widely in Charles County. Remote, rural areas of Charles County generally have lower land costs, but will have higher transportation costs. As environmental and legal requirements become more complex, the costs associated with obtaining a permit rise. The cost of obtaining a permit depends on the changing requirements of the federal and state regulations and the complexity of the site. The costs for developing a landfill can include roadways, fencing, monitoring wells, and on-site facilities.

Costs for construction of a municipal waste landfill are dependant on the following major activities including:

- Excavation
- Liner Construction
- Leachate Collection and Treatment/Disposal Systems
- Ground and Surface Water Monitoring Systems
- Stormwater and Sediment and Erosion Controls
- Ancillary Facilities and Equipment

The liner and leachate collection/removal system are generally the most expensive components of a landfill. Construction costs for a double-lined landfill are estimated to be in the range of $200,000 to $400,000 per acre.

4.7.1.2 Advantages

Municipal waste landfills are a necessary element of solid waste management for Charles County. State-of-the-art landfills are more sophisticated and environmentally protective than the unlined landfills of the past. Cost on a per-ton-basis for municipal waste landfills are often substantially lower than other management options (e.g., incineration, composting). Other management options are generally more labor intensive, have more extensive maintenance requirements, and are more reliant on high-technology machinery.

4.7.1.3 Disadvantages

Landfilling represents a long-term potential liability, with the post-closure period extending for many years after the cessation of operation. Post-closure costs will be incurred annually during the time that the County owns the property. Post-closure requirements include leachate collection and treatment, gas management, and groundwater monitoring. In addition, costs of construction are increasing, and the potential for adverse environmental impacts is present. Because of this potential, there is significant public opposition to siting new municipal waste landfills. A municipal waste landfill requires a substantial amount of land which is diverted from other beneficial uses.

4.7.2 Evaluation of the County's Existing Sanitary Landfill

The Charles County Sanitary Landfill (also referred to as Charles County Landfill #2) opened on July 1, 1994 in Waldorf, Maryland. The Pisgah landfill closed as a result of a Consent Order issued by

the Maryland Department of the Environment on July 31, 1994.

The new landfill has several features which provide several environmental safeguards as well as serving the citizens more efficiently and effectively. The environmental safeguards include a composite liner of clay and a 60 mil HDPE memrane, a leachate collection system, two stormwater management ponds for the entire site, and a passive methane collection system. To better serve the citizens of Charles County, the landfill was built with a citizen disposal area on asphalt with a volume based payment system named "Tag-A-Bag". A staffed recycling center that accepts a wide variety of materials, and a small drop off area on concrete for bulk loads of waste from pick-ups, van, and trailers. Dual scales expedite truck traffic with a fully computerized scale house.

The landfill was designed with a life expectancy of 12 years and 8 months based on historical volumes and compaction rates. Since opening, the volume of refuse entering the landfill is approximately half of the previous rates and a more aggressive compaction rate was adopted resulting in a landfill life expectancy of over 25 years.

Since constructing the landfill in July 1994, the County has meticulous records regarding the amount of waste accepted and volume of fill material used to cover the refuse. This information combined with aerial surveys using the latest technology have resulted in a series of reports.

4.8 LAND DISPOSAL - RUBBLE WASTE

4.8.1 Technology Assessment

As specified in *COMAR* 26.04.07, rubble landfills may accept the following:

- Land-Clearing Debris
- Demolition Debris
- Construction Debris
- Asbestos Waste
- Household Appliances and White Goods

As with a municipal waste landfill, rubble landfill technology involves compacting and covering solid waste within a confined area. All new rubble landfills are required to have liners and leachate collection systems and existing rubble landfills must meet these requirements by July 1, 2001 or cease accepting waste.

Rubble landfills have requirements similar to those described for municipal solid waste landfills for separation to groundwater, stormwater management, and water quality monitoring systems. Waste is placed and compacted in lifts of up to 8 foot thickness; 6 inches of soil cover must be applied at least every 3 days and 12 inches of intermediate cover must be placed within one month of completing a lift. Final cover consists of a two layer of vegetated soil.

Volume requirements for rubble landfills may be minimized through removal and recycling of certain components of the waste stream (Section 4.3.1.6). Grinding and chipping wood waste and

shredding tires prior to disposal can also be employed to increase the density of the waste, thus conserving landfill space.

4.8.1.1 Costs

Depending on whether the landfill is a lined or unlined facility, costs for a rubble landfill may be similar to a municipal waste landfill. Costs for pre-development, development, construction, operation and maintenance, and closure and post-closure for a unlined and lined rubble landfill are summarized below.

Unlined rubble landfill costs include the following:

- Pre-development costs are similar to the municipal waste landfill.
- Development costs are similar to the municipal waste landfill, except leachate management is not required.
- Construction costs are estimated to range from $100,000 to $400,000 per acre.
- Annual operation and maintenance costs are estimated to range from $3 to $5 per ton of rubble landfilled.
- Closure and post-closure are similar to the municipal waste landfill, except leachate handling and treatment, and landfill gas venting is usually not required. Closure costs are estimated to range from $90,000 to $140,000 per acre. Annual post-closure costs are estimated to range from $40,000 to $180,000.

Lined Rubble Landfill costs include:

- Predevelopment costs are similar to the municipal waste landfill.
- Development costs are similar to the municipal waste landfill.
- Construction are similar to the municipal waste landfill.
- Annual operation and maintenance costs are similar to the municipal waste landfill.
- Closure and post-closure are similar to the municipal waste landfill, except landfill gas venting is usually not required. Closure costs are estimated to range from $90,000 to $140,000 per acre. Annual post-closure costs are estimated to range from $40,000 to $180,000.

4.8.1.2 Advantages

Rubble landfills or a joint municipal waste/rubble landfill is a necessary element of solid waste

management in Charles County. This is for the simple reason that there are no other economically feasible solutions for a portion of the rubble waste stream.

4.8.1.3 Disadvantages

Landfilling represents a long-term potential liability, with the post-closure period extending for many years after the cessation of operation. Post-closure costs will be incurred annually during the time that the County owns the property. Post-closure requirements may include leachate collection and treatment, and groundwater monitoring. In addition, costs of construction are increasing, and the potential for adverse environmental impacts remain present. Because of this potential, there is significant public opposition to siting new rubble landfills. A rubble landfill requires a substantial amount of land which is diverted from other beneficial uses.

4.8.2 Evaluation of Existing Rubble Disposal

Only a fraction of the rubble generated in Charles County is disposed at the County's Sanitary Landfill. This due to two reasons: (1) there is no economic incentive; and (2) the County Commissioners have adopted a policy banning disposal of rubble from large commercial haulers in an effort to increase landfill life. Small contractors and homeowners who have building construction debris utilize the landfill due to its convenience. An additional factor is that the local rubble fill in Brandywine has a flat rate for disposal ($35.00 per Pick Up load) and most often the loads brought to the Charles County Landfill are charged up to $57.00 per ton.

There appears to be adequate capacity for locally-generated rubble at the Prince George's County landfill facilities during the ten-year scope of this plan. There are also a rubble fills in Anne Arundel County.

Due to the fact that these rubble fills are not required to document the place of origin of the inbound waste, there is no mechanism available to verify the estimates of rubble generated in Charles County The estimates generated for Frederick County would be very similar adjusted for population. Although the Regional Solid Waste Task Force that was in existence in 1994 recommended a regional rubble fill, there has been no action or further discussion of the matter.

4.9 SLUDGE MANAGEMENT

The Clean Water Act requires municipalities to cleanse wastewater prior to discharging it into the environment. This cleansing process generates sludge which in turn must be disposed or reused. Sludge management begins with sludge generation, and continues through treatment and ends with reuse and/or disposal. When properly reused, sludge can be a valuable resource as a soil conditioner and partial fertilizer. The EPA and the MDE encourage the beneficial reuse of sludge wherever environmentally feasible. As previously discussed in Section 3.6.9, wastewater treatment plant sludge from the Mattawoman WWTP and the Blue Plains WWTP is land disposed in Charles County.

4.9.1 Technology Assessment

The characteristics of sludge depend on both the initial wastewater composition and subsequent wastewater and sludge treatment processes utilized. The characteristics affect the various reuse/disposal options available to a municipality. The constituents that are usually the most important in the decision-making process for sludge management practices are:

- Organic Content
- Metals
- Pathogens
- Nutrients
- Toxic Organic Chemicals

For a treatment facility that receives primarily municipal wastewater, such as Charles County's Mattawoman WWTP, the quality of sludge does not limit the types of reuse/disposal options available. When treatment facilities receive large volumes of industrial waste, the facility does not generate a "clean sludge" (i.e., low concentration of metals in the sludge), thereby limiting the options available for sludge disposal.

The most common and accepted practices for the reuse or disposal of wastewater sludge include the following:

- Lime Stabilization/Land Application
- Heat Drying/Pelletization
- Composting
- Landfilling
- Incineration

4.9.1.1 Lime Stabilization/Land Application

Lime stabilization is a process where lime is added to sludge to increase the pH to a level which is destructive to pathogens and odor-producing organisms. The effectiveness of the lime stabilization process is directly related to the pH level achieved in the sludge and the contact time. Numerous studies performed have indicated that a significant reduction in pathogens and odors occurs when the pH is increased to 12 or more and maintained for 2 hours. Design criteria commonly recommend increasing the pH of the sludge to 12.5 by lime addition and maintain above 12.5 for 30 minutes. This method should keep the sludge pH above 12 for a period of 2 hours.

Lime stabilization does not result in the reduction of organic matter as do some biological stabilization methods such as digestion, but, rather the inactivation of biological activity. If the pH is allowed to decrease significantly, biological activity will resume and the production of odors will result. Lime addition should be sufficient to ensure that the pH of sludge does not drop to low levels after prolonged storage. When the lime dosage is too low, the stabilized sludge may attain the pH of 12 initially, but a rapid pH decay may occur. However, if the pH is raised above 12.5 and

maintained for 30 minutes, the pH can remain above 11 for up to 22 hours.

Lime dosage depends on a number of factors which include the following:

- Type of Sludge (e.g., primary, waste activated, etc.)
- Chemical Composition (including organic content)
- Sludge Alkalinity
- Solids Concentration

The actual lime dosage should, therefore, be determined on a case-by-case basis. Studies have shown that primary sludges typically require the lowest dosages, whereas waste activated sludges usually require the highest dosages. In addition, the studies have shown that chemical sludges, such as iron and alum, require high lime dosages.

The location of the lime stabilization process within the sludge processing treatment train can also impact the required lime dosage. Pre-lime stabilization consists of a lime slurry added and mixed into a liquid sludge prior to dewatering. Post-lime stabilization involves adding lime in a powdered form to dewatered sludge cake and blending the two together. The mixing is typically accomplished using a pug mill, or paddle mill mixer.

Odors are substantially reduced because the high pH level eliminates or suppresses the growth of microorganisms producing malodorous gases. Hydrogen sulfide, one of the major odors in a sludge processing operation is converted to the nonvolatile forms of hydrogen sulfide and sulfur compounds as the pH is increased to 9 and above.

Pathogens can be reduced 99 percent or more in sludges that have been lime treated to a pH of 12 or greater. The pathogen concentration in lime stabilized sludges can be 10 to 1000 times less than concentrations in anaerobically digested sludges. Studies have shown that lime dosages are typically lower in post-lime stabilization than in pre-lime stabilization operations to achieve the same degree of pathogen destruction. It is suggested that the destruction of pathogens may be enhanced in post-lime stabilization due to the heat generated during hydration of dry quicklime in the sludge.

Land application, defined as the spreading of stabilized sludge on or just below the surface of the land, is a sludge utilization technique utilized by many wastewater treatment facilities in the nation. The land application process incorporates wastewater sludges into soils, thereby providing a valuable resource to improve the characteristics of the land. The sludge can serve both as a soil conditioner and as a partial replacement for commercial fertilizers. Agricultural use of sludge is the most widely used land application method and is often the most economical of sludge disposal methods.

Municipal wastewater sludge is also recognized to have valuable soil nutrients and can serve as a partial replacement for expensive chemical fertilizers; nitrogen, phosphorus, and small amounts of potassium, are found in wastewater sludge. For beneficial reuse, the sludge is typically applied at agronomic rates to agricultural land. An agronomic rate is the rate at which nitrogen and/or other nutrients supplied by the sludge meet the nutrient requirements of the crops being grown. Nitrogen is usually the limiting parameter.

The purpose of applying sludge at these rates is to minimize the leaching of sludge nutrients into the groundwater. Controlled application rates also limit the buildup of heavy metals and other contaminants in the soil.

Site characteristics greatly affect the potential environmental impacts of sludge application. Factors of concern include depth to groundwater, distance to surface waters, slope of the site, soil permeability, and soil pH. Other site characteristics of importance are the proximity of the site to social and cultural activities such as homes and public buildings.

As with commercial fertilizers, the primary means of managing land application of municipal wastewater sludge is by controlling the application rate to optimally disperse sludge constituents. The application rate is the principle factor to be considered in determining the amount of land required. The greater the application rate, the less land needed to handle the sludge produced. Rates of application are calculated based on permissible sludge constituent concentrations and soil characteristics.

Land application is a suitable disposal technology for either liquid or dewatered sludge. Liquid sludge is commonly applied by surface or subsurface injection techniques. If applied on the surface, the sludge can be incorporated into the upper layer of soil by plowing or discing. This is accomplished after application by a tractor pulling a plow-like applicator.

The other method of liquid sludge application is subsurface injection, which is a commonly used method of application in Prince George's County, Maryland. This method requires specially designed sludge application vehicles, which allows the sludge to be injected beneath the surface without turning the soil. Sludge injection essentially eliminates odors associated with land application of municipal domestic sludges.

Dewatered sludge can be surface applied or injected. In surface application, the sludge is first spread on the soil surface and subsequently incorporated into the upper layer of soil by plowing and discing. The operation is similar to an application of animal manure and requires a spreader, followed by a tractor to plow or disc the material into the soil. For subsurface injection, the hauler typically adds water to the sludge at the site to facilitate injection.

All land application programs require storage facilities for periods of inclement weather, and in the event of equipment failures and other service disruptions. Sludge disposal trucks are not able to enter disposal sites when the ground is soft. Storage is also required because MDE does not permit land application during periods in which the surface soils of the sludge land application area are water saturated or frozen.

A. Advantages:

Municipalities in every part of the country are successfully using land application programs and have been doing so for many decades. Land application has been used successfully by both small towns and large cities. Currently, about 25 percent of the nation's sludge is land applied. This breadth of experience has shown land application to be a safe and effective wastewater sludge use option.

Lime stabilization of the sludge is not sensitive to toxic substances in the sludge and pathogens can be reduced 99 percent or more. The land application of sludge is a relatively easy technology to use which can be operated on an intermittent basis. By maintaining pH levels, odors are eliminated. The land application of sludge provides a beneficial use and is the most cost-effective sludge management option.

B. Disadvantages:

The lime stabilization process increases the volume of sludge to be disposed when compared to biologically stabilized sludges. This is an important consideration since the volume of sludge increases annually, while the land available for land application decreases. The stabilization processes produces a drier sludge cake which makes subsurface injection more difficult.

The stabilization process requires the handling of dry lime throughout the process. Additionally the process is mechanically dependent; and scaling of the equipment must be maintained at appropriate levels.

Odor is a potential problem if the process is not managed properly. In addition, storage facilities may impact the environment if not managed properly.

4.9.1.2 Sludge Composting

Sludge composting is the controlled, aerobic, thermophilic decomposition of organic matter to a relatively stable humus-like material. Bacteria, fungi, and actinomycetes are primarily responsible for the decomposition process. Environmental factors which control the rate and course of the reaction are the volatile solids and moisture content, oxygen concentration, temperature and nutrient concentration of the compost. The composting process generates heat, raising the temperature of the material in the range of 55 to 80EC (130 to 175EF). The heat increases the rate of decomposition, evaporates moisture, and effectively destroys or inactivates pathogenic microorganisms and parasites. The end-product of the process, compost, is an organic material which can be easily stored, handled and applied to land as a soil conditioner and low-grade fertilizer. The finished compost is relatively odorless with a slight ammonia or "wet earth" odor.

Composting is classified by the EPA as a Process to Further Reduce Pathogens (PFRP), which allows unrestricted use of compost. Although composting is not a true sludge disposal process, the finished product is valuable enough to warrant removal and reuse by an outside source.

Initially in composting systems, dewatered sludge and bulking material are mixed together. The bulking material usually consists of sawdust, wood chips, or other carbonaceous material. In addition to serving as a carbon source, the bulking material will increase the porosity and decrease the moisture content of the mixture, so that aerobic conditions can be maintained. Shredded tires and other non-carbonaceous material may also be used to provide porosity; however, an additional carbon source as amendment may then be required.

The three basic compost processes utilized in the United States includes the windrow, aerated static

piles, and in-vessel methods. Each method of composting may vary in the time required for stabilization, the degree and quality of process control, and the complexity of the system. However, the finished product from each method is essentially the same.

The active composting process occurs for 2 to 6 weeks depending on the composting method employed and other environmental factors. During that time, the mixture is either mechanically or force aerated and the process generates temperatures in excess of 50E to 60EC (122E to 140EF), resulting in pathogen destruction, moisture removal, volume reduction and solids stabilization. After the active composting period, the material is generally cured for an additional 2 to 6 weeks. Further stabilization and drying takes place during this period. The oxygen requirements during the curing are significantly less than during the composting step. The cured compost may be screened, if required, to remove bulking material for distribution as finished product.

Finished compost is a stable humus-like substance with valuable properties as a soil conditioner. Although compost is not high enough in nitrogen to be considered a fertilizer, it contains several macro- and micronutrients that are favorable to plant growth. As a soil conditioner, compost will improve a soil's physical properties. The addition of compost to sandy soils will increase the soil's ability to retain water. In heavy-textured clay soils, the added organic matter will increase permeability to water and air, and minimize runoff by increasing the water infiltration into the soil.

A. Systems:

1. Windrow Composting - Windrow composting involves mixing dewatered sludge (digested or stabilized to minimize odor generation) with a bulking material and forming long triangular windrows. The windrows are generally 10 to 16 feet wide and 4 to 6 feet high. The operation is typically conducted on a paved, uncovered area. Aeration of the compost is achieved by mechanically mixing or turning the windrows using specialized equipment. The frequency of turning varies from three to five times per week depending on the actual composting process. Windrow turning is the only means of effecting process control such as temperature and oxygen concentration in a conventional windrow.

   A conventional windrow may be modified by providing a single aeration channel under the entire length of the windrow. This is called an aerated windrow and provides a more positive means of odor, temperature and process control than a conventional windrow. Any bulking material may be used. The quantity of the bulking material is adjusted to obtain a solids content of approximately 35 to 40 percent. If wood chips or other large bulking material are used, a final screening operation is required to produce a marketable product. After the composting period, the mixture must be cured for an additional 20 to 30 days to provide a dry, stable finished product.

2. Aerated Static Piles - Aerated pile composting consists of mixing the dewatered sludge with wood chips or other large bulking material, forced aeration during the composting process, and screening. Aerated pile composting systems have utilized primary or unstablized sludge; however, odor generation has been a problem. In aerated composting, the mixture is formed into

extended piles approximately 8 feet high. These piles rest on top of perforated aeration piping, which is embedded and covered with bulking agent to promote even air distribution within the pile. The entire compost pile is then covered with finish compost to provide insulation and minimize odor generation. Aerobic conditions are maintained during the typical 20 to 30 day active composting period. Aeration can be either positive, blowing air up through the piles, or negative, drawing air down through the piles. With negative aeration, odor can be minimized by exhausting the off-gases through odor control devices. Following the composting period, the compost must be cured for 20 to 30 days to completely stabilize and ensure dryness. The finished compost is then generally screened to remove bulking material.

3. In-Vessel - An in-vessel composting system generally consists of two enclosed mechanical reactor vessels, a bioreactor, and a cure reactor. Some systems, however, use a single vessel for both steps or replace the enclosed cure reactor with an open concrete cure pad.

   Initially a feed mixture of dewatered sludge, bulking agent, and recycled compost is introduced into the first-stage reactor. Digested and undigested, primary and secondary sludges are suitable for in-vessel composting. Due to operation and economic considerations, it is desirable to have a high solids concentration in the feed sludge. The feed mixture (sludge, new bulking agent, and recycled compost) flows through the reactor as composting occurs within the vessel. The hydraulic residence time (HRT) in the bio-reactor is approximately 14 days. Each manufacturer's composting system employs various methods of air feed to provide uniform aerobic conditions and to control the composting process. Temperatures developed in the bioreactor result in moisture removal, volume reduction, pathogen kill and solids stabilization. Compost from the bioreactor is transferred to the cure reactor for additional organic conversion and stabilization. Aerobic conditions are maintained to promote additional drying and stabilization during a typical 14-day residence time. Finished compost is discharged from the cure reactor for distribution or recycle. Recycling of finished compost will reduce the amount of bulking material required in the feed mixture, and decrease the moisture content of the mixture.

   In-vessel systems can be configured in many ways. Typical configurations currently being marketing in the United States include:

   - Vertical, Plug-Flow Cylindrical Silos
   - Vertical, Plug-Flow Rectangular Silos
   - Circular, Agitated-Bed Reactors
   - Rectangular, Agitated-Bed Bin Reactors
   - Rectangular, Plug-Flow Tunnel Reactors

B. Advantages:

Leachate and condensate produced during composting are minimal and easily treated by standard wastewater treatment plants. Sludge composting is a viable stabilization process which further reduces pathogens. The process produces a good soil amendment and nutrient source which may be used for landscaping, potting soil, or agricultural purposes. The sludge is reused as a resource.

C. Disadvantages:

Sludge composting provides the potential for odor generation. Large amounts of carbonaceous bulking material is required for the process. Compost must be screened prior to marketing to separate bulking material from the finished product. High capital costs, especially for the mechanical systems. Not an ultimate disposal method — requires distribution and marketing.

4.9.1.3 Heat Drying/Pelletization

Heat drying is a unit operation process that involves evaporating water from sludge by thermal means. This process raises the temperature of the incoming sludge to remove moisture which reduces total volume. The temperature to which the sludge is raised is too low to destroy organic matter, therefore, the nutrient properties of the sludge are retained. The end product contains soil nutrients and is free of pathogenic organisms.

Heat drying is classified by the EPA as a Process to Further Reduce Pathogens (PFRP). Although heat drying/pelletization is not a true sludge disposal process, the finished product is valuable enough to warrant removal and reuse by an outside source.

Sludge moisture content is normally expressed in percent moisture, percent solids, or pounds water per pound dry sludge. The minimum sludge moisture content, practically attainable with heat drying, depends upon the design and operation of the dryer, moisture content of the sludge feed, and the chemical composition of the sludge. For ordinary domestic wastewater sludges, sludge moisture contents as low as 5 percent may be achieved. Chemical bonding of water within the sludge, which can occur through chemical addition for sludge conditioning, can increase the amount of water retained in the dried sludge product beyond the 5 percent moisture level. Heat-dried sludge typically has a moisture content of 10 percent or less.

In heat drying of sludge, water is transferred to the gas phase. The driving force for transfer is the difference between absolute humidity (pounds water per pounds dry gas) at the wetted solid/gas interface and the absolute humidity in the gas phase. The difference in temperature between the heating medium and the sludge/gas interface provides the driving force for heat transfer in a sludge heat-drying process. Dryers are commonly classified on the basis of the predominant method of transferring heat to the wet solids being dried. The most common methods include convection (direct drying) and conduction (indirect drying).

Heat transfer by convection (direct drying) is accomplished by direct contact between the wet sludge and hot gases. The sensible heat of the inlet gas provides the latent heat required for evaporating the water. The vaporized liquid is carried off by the hot gases. Direct dryers are the most common type used in heat drying of municipal sludge and consist primarily of rotary dryers.

Heat transfer by conduction (indirect drying) is accomplished by contact of the wet solids with hot surfaces, such as a retaining wall separating wet sludge and the heating medium. The type of indirect dryers used with municipal sludges include dryers with large rotors and a vertical multiple stage dryer.

Thermal evaporation of water from sludge requires considerable energy. The amount of fuel required to dry sludge depends upon the amount of water evaporated. It is imperative that a dewatering step precede heat-drying so that overall energy requirements can be minimized. The heat required to evaporate water from wet sludge is comprised of the following:

- Heat to raise the sludge solids and associated residual water to the temperature of the sludge produce as it leaves the dryer.
- Heat to raise the water temperature to the point where it can evaporate and then to vaporize the water (latent heat).
- Heat to raise the temperature of the exhaust gas, including water vapor, to the exhaust temperature.
- Heat to offset heat losses.

Since the energy required to operate a sludge heat dryer is directly related to the volume of moisture required to be removed, most drying systems recycle dried sludge back to the feed end of the dryer. The dried sludge is blended with the incoming dewatered sludge (typically at 15 to 20 percent solids) to reduce the overall moisture content of the sludge. The desired sludge feed is typically around 55 to 60 percent solids. Below this solids concentration, the feed sludge is in a "glue-like" phase and does not move through the dryer easily. The drier feed solids reduce agglomeration (large balls) of sludge, thus exposing a greater solids surface area to the drying medium. Regardless of the type of drying system, the process should be preceded by mechanical dewatering and followed by air pollution control systems.

A. Dryers:

1. Direct Rotary Dryers - This type of dryer is the most commonly used in the United States for drying municipal wastewater sludges. Hot drying gases at temperatures of 1200EF (650EC) are added to the dryer, usually in a concurrent flow pattern. Gas velocities must be limited to 4 to 12 feet per second to prevent dust from being entrained with the exhaust gases. The dryers are typically built as either a single pass or triple pass dryer. The triple pass dryers are more advantageous than single pass dryers in that better control and contact time between the sludge and drying gases are provided, as well as the length of the dryer can be reduced.

   The rotary drum usually consists of a cylindrical steel shell that revolves at 5 to 8 revolutions per minute. One end of the dryer is slightly higher than the other, and the wet sludge which has been blended with dried sludge product, is fed into the high end. Flights projecting from the inside of the shell continually raise the material and shower it through the drying gases, moving the material toward the outlet. After the sludge has been held in the dryer for 20 to 60 minutes, the dried sludge is discharged at a temperature of 180E to 200EF (82E to 93EC). Exhaust gases are conveyed to a cyclone where entrained solids are separated from the gases. The spent gases exist at about 300EF (149EC). A portion of the dried product is recycled (blended with wet sludge feed), and the balance goes to storage. The sludge product from this type of drying system is shaped into little round balls due to the rotating action of the dryer. Therefore, a separate pelletization step is not required to produce a marketable product. Gaseous discharge from the cyclone is exhausted to an air pollution control system for deodorization and particulate removal

as necessary.

2. Indirect Rotary Disc Dryers - The dryer consists of a rotor mounted in a stator formed as a horizontal shell. This rotor is built up by a tabular shaft carrying a number of hollow disc filled with steam or a thermal oil and provided with agitator blades to ensure transport of the material. The rotor (discs and shaft) is completely submerged in the sludge. The sludge is transported through the dryer in a plug-flow fashion, passing through the annulus between the discs and the drum.

   Scraper bars project into the space between the discs to prevent coating of the heating surfaces and stop the material from following the rotation of the rotor. The scraper also produces a vigorous turbulent action within the dryer that improves heat transfer by inducing maximum particle contact with the heating surfaces and releases the vapor from the bulk mass of the sludge into the vapor dome. The stator can also be supplied, if necessary, with a steam or oil jacket for additional heat transfer.

   The dryer is operated as a closed system; therefore, it does not require sweep air or drying gases. With a closed dryer system, particulates and odors are a minor problem. The heating medium enters the dryer through the central shaft and is distributed inside the rotor by a vacuum created through condensation. Each individual disc is accordingly filled with steam or thermal oil to ensure that the entire heating surface achieves the maximum temperature. Although some air will enter with the sludge, the exhaust vapor is, for all practical purposes, considered low pressure steam. The waste heat contained in the exhaust vapor can be easily and efficiently recovered for thermal conditioning of the sludge feed, which will increase the overall efficiency of the drying system.

   The dried sludge leaving the dryer is in a powder form. A portion of the sludge is returned to the front of the dryer and blended with the dewatered (wet) feed sludge. The remainder of the sludge is sent to a pelletizing operation so that a marketable product can be produced.

3. Indirect Vertical Multistage Dryer - This type of dryer resembles a multiple hearth furnace. Incoming sludge is fed into the top inlet and moved by rotating arms from one heated tray (level) to another in a zig-zag motion until the sludge exits at the bottom as a dried, granular (pelletized) product. The dryer trays are hollow and are heated by steam or recirculating thermal oil.

   The rotating arms are equipped with adjustable scrapers, which move and tumble the sludge in thin layers and small windrows over the heated trays enhancing heat and mass transfer. The drying and pelletizing process starts with fine particles which gradually, layer by layer, grow larger, drying from the center to the outside. Formation of dust and oversized chunks is minimized. By recycling the dried sludge, the dryer feed is kept at a moisture content between 60 and 70 percent total solids avoiding the glue-like phase inside the dryer and facilitating granulation.

B. Advantages:

Sludge pelletization is considered a process to further reduce pathogens. The process is compatible with various disposal options (e.g., landfilling, incineration, land application). Sludge pelletization produces a marketable product and allows sludge to be reused as a resource (e.g., fuel or soil amendment). Pelletization provides large volume reduction.

C. Disadvantages:

Sludge pellitization requires a high operational costs, primarily due to fuel requirements. The process is highly mechanical and requires highly trained operators. There is a high potential for odor production unless control devises are utilized. The process is not an ultimate disposal method; therefore, the product requires distribution and marketing, unless coupled with an incineration process.

4.9.1.4 Incineration

Incineration is a high temperature, two-step oxidation process in which wastewater sludge and a fuel source (if needed) are combusted in an enclosed reactor. The combustion reaction may be divided into two process steps. The first step raises the temperature of the feed sludge to 212EF (100EC) which evaporates water from the sludge and increases the temperature of the mixture. Combustion actually occurs in the second step which increases the temperature of the mixture until the combustible elements in the sludge and fuel ignite. The heat produced by the combustion reaction induces organic and microbial destruction and additional moisture evaporation. The by-products of the reaction are suspended particulates, off-gases, and an inert ash residue. The suspended particulates are contained in the off-gases and are removed by air pollution control devices, such as a wet scrubber, venturi, or electrostatic precipitator. The off-gases are a mixture of nitrogen oxides, sulfur oxides, carbon dioxide, and hydrocarbons and are released to the atmosphere after particulate removal. The inert ash is typically disposed in a sanitary landfill.

The amount of oxygen supplied and the heating value and moisture content of the feed sludge affect the efficiency of the combustion process. Incineration is complete combustion and occurs when air (oxygen source) is supplied 50 to 150 percent in excess of the stoichiometric or theoretical requirement. When the amount of air is inadequate for complete combustion, soot, carbon monoxide and odorous hydrocarbons are produced. Since the excess air exerts a heat demand, it should be held to the minimum amount required for complete combustion. The amount of heat released from a given sludge is dependent upon the amount of combustible elements present which is quantified as the heating value of a sludge. Sludge stabilization prior to incineration is undesirable.

Chemical stabilization will produce chemical sludges which have low heating values, therefore requiring excess fuel to incinerate. Biological stabilization (digestion) reduces the volatile concentration and consequently the heating value of a sludge, which increases the amount of supplemental fuel required for the process.

A combustion process is termed autogenous when the heating value of the sludge is sufficient to

raise the temperature of all incoming substances to combustion levels. If the heating value of the sludge is not sufficient, supplemental fuel must be burned to make up the heat deficit. Moisture in the sludge exerts a significant energy demand to vaporize the water. After considering radiation losses, and for heating of gas streams and sludge feed solids, approximately 3,500 BTU are required for every pound of water evaporated in an incineration process. Therefore, sludges containing a low solids content will require supplemental fuel for moisture reduction. Typically, wastewater sludge must be dewatered to about 30 to 35 percent solids to enable autogenous combustion to occur. Sludge incineration systems burning autogenously have nominal fuel requirements and require auxiliary fuel only during start-up. In addition, a smaller capacity incineration system is needed with a drier sludge.

A. Systems:

Two types of systems commonly used in the United States for sludge incineration are the multiple hearth incinerator and the fluidized bed incinerator.

1. Multiple Hearth Furnace - The multiple hearth furnace (MHF) has been the most widely used type of sludge incinerator. It is designed for continuous operation and is relatively simple to operate, durable and capable of handling varying feed patterns. A MHF is cylindrically shaped, containing a series of horizontally mounted hearths. MHFs are available with diameters ranging from 4 to 29 feet and can have from 4 to 14 hearths. However, for wastewater sludge incineration, a maximum of 8 hearths is usually recommended. Feed sludge is introduced into the uppermost hearth and is radially transported by either two or four rabble arms sweeping across the top of the hearth. The central shaft and rabble arms are air-cooled. The rabble arms are designed to move the sludge either inward, away from the hearth periphery, or outward, toward the hearth periphery. As the transported sludge reaches the inside or periphery of the hearth, it cascades downward onto the next lower hearth where a rabble arm transports the sludge radially as in the hearth above. The sludge moves inward and outward across the hearths, while traveling downward through the incinerator.

   An MHF can be divided into four process zones. The first zone, which consists of the upper hearths, is the drying zone where most of the water is evaporated. Since this zone operates at 600 to 900EF, uncombusted volatiles and hydrocarbons can be released in the exhaust gas causing odor and air pollution problems. In many instances, an afterburner must be installed to heat the exhaust gases to combustion temperatures (1400EF) oxidizing the odorous pollutants. The operation of an afterburner results in added fuel consumption. The second zone, consisting of the central hearths, is the combustion zone. In this zone, the majority of combustibles are burned in temperatures ranging from 1400E to 1700EF. The third zone is the fixed carbon burning zone, where the remaining carbon is oxidized to carbon dioxide in temperatures reaching 1800EF. The fourth and last zone consists of the lowest hearths and is the cooling zone (temperatures of approximately 300EF). In this zone, ash is cooled by the incoming combustion air. The sequence of these zones is always the same; however, the number of hearths in each zone is dependent on the quality of the feed, the design of the furnace, and the operational conditions. An MHF can be provided with heat recovery equipment such as air to air heat exchangers and heat recovery boilers.

2. Fluidized Bed Furnaces - These type of incinerators have also been widely used for sludge incineration. Combustion in a fluidized bed furnace (FBF) occurs within an expanded sand bed inside a cylindrical incineration chamber. An FBF is normally available in sizes ranging from 9 to 25 feet in diameter. Sludge, auxiliary fuel (if required) and combustion air are introduced into a sand bed located in the lower portion of the incinerator. Combustion air is injected into the bottom of the incinerator at a pressure of 3 to 5 pounds per square inch (gauge). This causes the sand bed to expand to approximately twice its original volume. The turbulent mixing within the expanded bed induces complete combustion of the sludge particles by allowing the sludge in the reactor to move throughout each section of the reactor during the combustion process. The bed temperature is controlled between 1400E and 1500EF by auxiliary burners located either above or below the sand bed. The air requirement of an FBF is determined by several factors including bed expansion, sand loss in the exhaust gas, and complete combustion. The quantity of excess air for complete combustion ranges from 25 to 45 percent which is less than the requirements for an MHF. As the sludge combusts, the moisture and combustible organics are eliminated, leaving a low density ash residue which is then carried by the gas stream out of the reactor vessel. Sand is also carried out with the ash and must be replaced. Sand losses are approximately 5 percent of the bed volume for every 300 hours of operation. The sand in the fluidized bed furnace also retains combustion heat when the system is not operating; thereby enabling a fluidized bed incinerator to economically endure periods of downtime lasting 18 to 20 hours without using substantial quantities of fuel upon start-up.

   A venturi scrubber air pollution control system removes ash from the incinerator off-gas. The ash is then thickened and/or dewatered for disposal. Energy recovery through the use of a hot windbox can reduce fuel costs. A hot windbox uses recoverable heat from the exhaust gases to preheat the fluidizing air prior to injection into the combustion chamber.

B. Advantages:

Incineration requires no prior sludge stabilization and affords the maximum volume reduction of sludge (approximately 95%). Minimal land requirements and labor requirements. Energy recovery can be incorporated into the system to lower operating costs.

C. Disadvantages:

The primary environmental issues for sludge incineration are air pollution and ash disposal. Incineration is an energy intensive process. The process has high capital operation costs. Sludge incineration is mechanically complex requiring highly skilled operators.

4.9.1.5 Landfilling

Co-disposal of sludge with refuse in municipal solid waste landfills has a long and well-established history. It continues today as an acceptable method of sludge management and is allowed under Maryland solid waste and sludge management regulations. However, the Charles County Commissioners have banned the disposal of sludge within the County's Sanitary Landfill.

The basic criteria and requirements for determining the acceptability of landfilling sludge in Maryland include the following:

- A separate permit is required for sludge disposal at any landfill.
- All sludge disposed in a sanitary landfill must be stabilized.
- The landfill must have adequate on-site equipment capable of handling the incoming sewage sludge.
- The owner/operator of the landfill must approve the project.

The following is a list of methods used to dispose of sludge in municipal solid waste landfills:

- Mix sludge with refuse and apply it to the working face.
- Blend sludge with soil and apply it as daily cover material.
- Apply sludge to finished cover to promote vegetation growth and enhance erosion control.

Blending sludge with daily or final cover involves essentially the same practices as land application. As such, these methods are subject to the same climatological problems as land application and are not considered a good emergency back-up system. Co-disposal with municipal solid waste is much better suited for emergency disposal operations.

When mixing sludge and refuse in a municipal solid waste landfill, sludge and solid waste are blended with dozers in the working face and compacted. Usually, landfill operators attempt to keep the ratio of solid waste to sludge very high in order to minimize problems associated with sludge sticking to the undercarriages and frames of dozers and compactors. Timing of sludge deliveries is also an important factor since there must be sufficient refuse available to blend with the sludge.

A. Advantages:

The landfilling of sludge is a good all-weather emergency disposal method; can increase gas production in municipal waste landfills, thus, increasing energy recovery. Land filling is a simple, reliable management approach.

B. Disadvantages:

Landfilling affords no beneficial reuse of the sludge and takes up valuable space in the municipal waste landfill. Operational problems with blending of municipal solid waste and the potential for affecting municipal solid waste leachate quality. Land filling sludge may be costly, depending upon municipal solid waste tipping fees.

4.9.2 Evaluation of Existing Sludge Management

The most cost-effective and environmentally acceptable sludge management disposal alternative is lime stabilization/land application. Capital expenditures and potential impacts associated with sewage sludge composting, incineration, and pellitization make these alternatives less feasible at this time. Additionally, Charles County has banned the disposal of sewage sludge in the municipal waste

landfill. For these reasons, the existing sludge management method of land application is, at this time, the most feasible option.

The MDE is responsible for reviewing and issuing permits for the land application of sludge in Maryland. Charles County residents have expressed a great deal of concern regarding the land application of sewage sludge in Charles County. As a result, the County initiated an inspection process to investigate and respond to concerns regarding land application practices in Charles County.

In addition, the County requires a separate transportation permit to haul sludge to land application sites within the County. Permit applications for the transportation of sludge into the County are reviewed by the County Commissioners for compliance with Charles County policies, as well as other rules and regulations. Applications are approved, conditionally approved, or denied by the Charles County Commissioners.

4.10 SPECIAL WASTE MANAGEMENT

Special waste management requirements for asbestos, special medical waste, hazardous waste, household hazardous waste, emergency response for hazardous waste spillage or leakage, and procedures for handling non-hazardous contaminated soils will be discussed in this section.

4.10.1 Asbestos

The Charles County Landfill is permitted to receive asbestos, however, currently only accepts asbestos materials from government institutions (schools, government buildings, etc.).

Asbestos disposed at the site must be packaged and labeled in accordance with *COMAR* 26.11.15.04. Procedures for disposal are as specified in *COMAR* 02.04.07.13.

- A minimum 24 hour notice to the landfill supervisor to provide information regarding delivery time, source, and quantity.

- Personnel handling the asbestos wear disposal protective clothing and respirators.

- The asbestos is handled with care to reduce the emission of fibers into the air. Asbestos is delivered to a separate area of the landfill for disposal.

- The asbestos is placed in a trench and completely covered with soil.

The above procedure recognizes that the health threat posed by asbestos is the release of asbestos fibers to the atmosphere and inhalation by humans. Once properly buried within a landfill and isolated from the atmosphere, asbestos poses no known health risks.

4.10.2 Special Medical Waste

The County landfill will not accept special medical wastes, including infectious and/or bio-hazardous medical waste. Currently, special medical waste generated at the hospital is incinerated on-site.

The management of special medical waste is strictly regulated by the MDE under specific medical waste regulations. However, the County reserves the right to address the management of special medical waste under a separate plan.

4.10.3 Hazardous Waste

The County landfill does not accept hazardous substances for disposal other than small quantities of household hazardous wastes. Currently, hazardous waste generators within the County contract with a licensed hauler of hazardous waste for collection and disposal.

Hazardous waste storage, transport and disposal is strictly regulated by the MDE. However, the County reserves the right to address the management of hazardous waste under a separate plan.

4.10.4 Household Hazardous Waste

Several options are available to local governments for reducing the quantity of household hazardous waste disposed in landfills. These options include the following:

- Promoting source reduction through public information programs that emphasize the use of alternative non-hazardous products and the proper handling and disposal of hazardous household materials.

- Holding periodic hazardous waste collection days for residents.

- Establishing a permanent residential hazardous waste collection center where such waste can be collected on a continuous basis.

One drawback with the second option is that citizens must store quantities of hazardous materials in their homes between collection days, sometimes for extended periods of time. And while both the second and third options are costly, the third option require substantially greater staffing, facilities, and disposal costs.

Charles County holds a household hazardous waste collection day the first Saturday of every month at the Landfill, from April through December. Waste quantities continue to rise as citizen participation continues to increase.

Collection programs can be costly; however, it is a good idea to prevent household hazardous waste from entering the landfill. Expanding the County's public education program in conjunction with a collection program continues to contribute to the environmental quality of the landfill, as well as sensitizing the public to their role in responsibly managing their waste.

4.10.5 Emergency Response for Hazardous Waste Spillage or Leakage

Charles County's adopted *Hazardous Materials Response Plan* prescribes, to the extent possible, actions to be taken in the event of an emergency or unplanned spillage of hazardous materials within the county. U.S. Route 301, a major north-south truck route along the Eastern Seaboard, traverses the county. Hazardous materials spillage events occur there several times per year. The *Hazardous Material Response Plan* assigns responsibilities for notifications and responses to various agencies within the County. In addition, the Charles County Government administers an emergency preparedness and risk management program, and in conjunction with the Sheriff's Department, provides lead staff in the event of such incidents.

The *Hazardous Material Response Plan* is based on the concept that emergency functions for the various groups responsible for responding to hazardous materials accidents will generally parallel their normal day-to-day functions. All emergency vehicles carry a U.S. Department of Transportation "Emergency Response Guidebook", which contains federal and industry approved protective measures. The *Hazardous Material Response Plan* is consistent with the emergency plans of other agencies/organizations, including the Charles County Sheriff's Department and the Maryland State Police. When implemented, this Plan will abate the hazard and restore conditions to normal.

4.10.6 Non-hazardous Contaminated Soils

The disposal method for soil contaminated with petroleum or petroleum products which are generated within Charles County is dependant on test results indicating the level of toxicity and contamination. The following information is required before the contaminated soil may be disposed in the County landfill.

- A statement from the generator certifying that the soil is non-hazardous waste as defined by federal regulations under Subtitle C, Resource Conservation and Recovery Act.

- The amount of petroleum contaminated soil to be disposed.

- A description of the sampling protocol and a copy of all laboratory analyses.

A minimum of one composite sample shall be analyzed for each required test for every 100 cubic yards of soil to be disposed. In the case of soil reclaimed by thermal treatment, a minimum of one sample shall be analyzed for every production day composited hourly. The test methods used to test contaminated soil are outlined in Appendix G.

4.11 LANDFILL MINING

A county owned landfill that is excavated to recover valuable waste materials. In the case of a sanitary landfill, areas that were filled prior to the implementation of waste-to-energy, materials separation, and recycling programs may contain combustible materials (for waste-to-energy); metals and other recyclable materials. In addition to recovering materials, landfill space and cover material (i.e., soil) can be reclaimed. In addition to excavation and hauling equipment, material separation

equipment such as that magnetic separators, optical separation systems (glass), balers, and crushers would also be used.

4.12 MUNICIPAL SOLID WASTE (MSW) COMPOSTING FACILITY

A centralized facility that accepts and processes the biodegradable portion of pre-separated municipal solid waste. In addition to yard waste, a MSW compost facility would process food waste, paper products and other clean wood wastes. MSW is usually composted within an enclosed reactor or building to optimize waste decomposition and to control odors. Several acres of land will be required to process and store the final composted product. Chippers and grinders are required to process wood waste. Front-end loaders and windrow turners may be required to move and turn the piles depending on the type of composting process. Trommels and screening equipment will be required to sort and remove large materials from the final product.

4.13 PUBLIC EDUCATION PROGRAM

Public awareness of, and concern for solid waste management issues has heightened considerably over the past 20 years. As a result, public opinion has played an important role in shaping public policy over such issues as the siting of solid waste management facilities, concerns over the increased cost of waste disposal, and widespread support for recycling. Informed and participating citizens is a key to a successful solid waste management program. In its publication entitled, *Decision Makers Guide to Solid Waste Management*, the EPA makes the following recommendations regarding public information and involvement

- Decision makers should involve the public early in the waste management planning process.

- Promotion and education programs should be tailored to the needs of each community and maintained throughout the year.

- Planning for public education and involvement requires that decision makers understand their audience, prepare a formal plan, and establish a method for evaluating the success of the programs.

- The public has a right and a responsibility to understand the full costs and liabilities of managing the wastes they produce.

Thus, the public should be involved in decision making with respect to solid waste management planning, and public education is critical to enable the public to make sound decisions.

In order to promote sound solid waste management practices, and encourage waste reduction and recycling and other appropriate waste disposal behaviors, Charles County's public education program informs county residents, businesses, and institutions about related county policies and programs. The County's education program consists of press releases, fliers, public workshops, and seminars.

4.14 SUMMARY OF SOLID WASTE MANAGEMENT ALTERNATIVES

Table 4-1 presents a summary of the alternatives discussed above and their ability to meet the goals and objectives of this Plan. In addition, the summary indicates whether or not each alternative will be considered in the Action Plan presented in Chapter 5.

4.15 SITING NEW ACCEPTANCE FACILITIES

The decision making process for selecting a solid waste management facility site involves the interaction of several factors. These factors include environmental, technical, economic and socio-economic, and socio-political considerations. Site selection develops a hierarchy of factors influencing the decision, and incorporates objective (quantitative) and subjective (value judgements) considerations into the evaluation of sites through a multi-level screening process.

- Environmental concerns deal with the effects that the facility will have on the ecosystem of the site and surrounding area, and permitting requirements. It includes impacts on wetlands, groundwater, surface water, endangered species, archaeological sites, historical sites, and environmentally-sensitive areas.

- Technical concerns involve the physical location and daily operational requirements such as access to roads, buffers, size and type of facility, soils, easements, sediment and erosion controls, stormwater management, and site utilization.

- Economic and Socio-economic concerns involve costs incurred to establish the site and the financial impact on near-by neighbors of the facility, particularly in comparison to any site being considered.

- Socio-political concerns deals with the reaction of local citizens, industry, and others to the siting process and final decision.

In order for the siting process to be effective, the methodology must consider the future impacts of the decision, involve the public, take conflicting views into consideration, and provide a usable tool with which county decision makers may make the final decision.

TABLE 4-1

SUMMARY OF SOLID WASTE MANAGEMENT ALTERNATIVES

Alternative	Rec*	Potential for Meeting Goals and Objectives of the *Charles County Comprehensive Solid Waste Management Plan.*
Collection:		
Free Enterprise	N	Existing system of collection (municipal waste). Allows competitive pricing for services based off of competition for business. Promotes private business and the freedom for consumers to choose their service provider.
Franchising	R	Provides opportunities for flow control and waste reduction incentives. However, private haulers could be negatively impacted and bureaucracy is increased. Best alternative for flow control.
Licensing	R	Allows for customer selection of haulers and a means for the county to implement policies for flow control and waste management practices.
Public Operation	N	Provides highest level of flow control. This alternative is not judged to be as cost-effective or efficient. Does not provide a mechanism for efficient integration of county and municipal efforts.
Recycling:		
Curbside Collection	R	Curbside collection is an important program for meeting the county's recycling goals. Necessary to achieve the required recycling rate.
Drop-Off Centers	R	Drop-off centers will continue to partially meet the objective for increased recycling. Provides more cost-effective and efficient means of recycling within the remote, rural areas of the county.
Buy-Back Centers	R	Buy-back centers provide an incentive to some who would otherwise not recycle. Existing centers are privately owned and operated and no cost is incurred by the county. Can help achieve the objective of maximizing recycling
Mixed Waste Processing Facility (MWPF)	N	This system ("dirty MRF") does not meet the *Charles County Comprehensive Solid Waste Management Plan* objectives of cost-effectiveness, environmental protection, and increased recycling. Does not provide for a high quality of recyclables
Material Recovery Facility (MRF)	N	Recommended for inclusion within the county program to provide a readily accessible outlet for recyclables. More information will be required from pilot recycling programs to evaluate options concerning regional and private material recovery facilities.
Rubble Material Recovery Facility (MRF)	R	Would complement the county's efforts at waste reduction and recycling, and would increase the longevity of the county landfill where the rubble is disposed.
Commercial Recycling	R	Commercial waste comprises about 56 percent of the waste stream; commercial recycling provides an excellent opportunity for Charles County to reduce the amount of solid waste requiring final disposal. Costs to the county for this program are minimal.

* Recommendation:
- R: Recommended for further consideration.
- N: Not recommended; eliminated from further consideration.

TABLE 4-1

SUMMARY OF SOLID WASTE MANAGEMENT ALTERNATIVES
(continued)

Alternative	Rec*	Potential for Meeting Goals and Objectives of the *Charles County Comprehensive Solid Waste Management Plan.*
Recycling (continued):		
Yard Waste Composting	R	A critical component of the County's recycling program. Cost-effective and efficient method in which to reduce the amount of waste requiring final disposal, conserving landfill space.
Solid Waste Composting	N	At the present time, the relatively high cost for solid waste composting eliminates this alternative from further consideration. Technology is not proven in the long run.
Municipal Waste Combustion and Waste-To-Energy:		
Municipal Waste Combustion	N	This alternative would be very costly for Charles County. Potential environmental impacts do not meet the goals and objectives of the *Charles County Comprehensive Solid Waste Management Plan.*
Waste-to-Energy	NC	This alternative would be very costly for Charles County. The Tri-County Regional Task Force has identified this as a long-term solid waste management option for the tri-county region.
Land Disposal:		
Landfills (Municipal Waste and Rubble)	R	Necessary, most cost-effective alternative for the management of wastes that cannot be recycled or reused. State-of-the-art facilities are necessary to protect public health and the environment.
Sludge Management:		
Lime Stabilization/ Land Application	R	Cost-effective and environmentally acceptable sludge management methodology; beneficial use of resource. Existing program permitted by MDE.
Heat Drying/ Pelletization	NC	At this time, capital expenditures to implement this system are not warranted.
Composting	NC	At this time, capital expenditures to implement this system are not warranted.
Incineration	N	Highest capital and operations cost; potential environmental impacts; does not reuse resource.

TABLE 4-1

SUMMARY OF SOLID WASTE MANAGEMENT ALTERNATIVES
(continued)

Alternative	Rec*	Potential for Meeting Goals and Objectives of the *Charles County Comprehensive Solid Waste Management Plan.*
Special Waste Management:		
Asbestos	R	County should reevaluate the current prohibition against asbestos waste in order to provide its citizens with a safe area to dispose of asbestos waste.
Household Hazardous Waste	R	County should expand public education program to include proper management, disposal, and alternatives for household hazardous waste. Periodic collection days should continue.
Special Medical Waste, Hazardous Waste, Emergency Response for Hazardous Waste Spillage or Leakage, Non-hazardous Contaminated Soils	R	The County's current management of these special wastes should continue.
Public Education	R	Critical component of the recycling and overall solid waste management program. Expansion is recommended to cover other aspects of solid waste management such as household hazardous wastes and source reduction.

* Rec = Recommendation:

R: Recommended for further consideration.
N: Not recommended; eliminated from further consideration.
NC: Not currently recommended; may be reconsidered in the future after further study and evaluation.

Site selection for a solid waste management facility is one of the most politically volatile issues that local governments face. Public attitudes and concerns are an integral part of the process of siting a new waste management facility. The public and political acceptability of the facility rests on the shoulders of the Charles County Commissioners and the local officials.

A sound framework for establishing a site is essential to providing the County and local officials with a solid foundation from which to arrive at a decision. Once the site decision is made, the County may continue forward to provide the community with an integrated solid waste management system.

The siting process for disposal and processing facilities involves a multi-level screening process, as described in Table 4-2. The first level screening process identifies areas in the County that are unsuitable for siting of land disposal and processing facilities based upon broad technical, environmental and land use criteria.

If a site passes first level screening, it is subjected to more stringent site-specific screening criteria as described in Table 4-2. The suitability of the site will also be evaluated through the requirements of the MDE permitting process, Charles County Department of Public Facilities, Charles County Planning and Growth Management Department, Charles County Commissioners, and through extensive public review through the Charles County citizen groups.

4.16 CONSTRAINTS ON THE SITING OF SOLID WASTE MANAGEMENT FACILITIES

Existing physical features and existing and planned uses of the land within Charles County affect the siting of waste management facilities. Solid waste management facility siting should be planned to minimize impacts on the citizens of Charles County and the environment.

A brief description of these constraints imposed on solid waste acceptance facilities based on technical environmental and land use concerns follows.

4.16.1 Topography

Charles County is located in the Atlantic Coastal Plain, therefore is a relatively low-lying area. Elevations range from 10 feet above sea level near the Potomac River to approximately 230 feet near Waldorf. Large portions of the County are exceedingly flat, with a gentle slope toward the Chesapeake Bay, or toward local drainage features. Broad plateau formations with sides dissected by drainage features are common throughout most of the County. This dissection reflects the nature of the soils underlying the County which are easily eroded clays, sands and gravels. In some areas, dissection is incomplete and flat areas several miles across have not as yet been reached by headward cutting streams. Stream valleys affect local topography throughout the County.

TABLE 4-2

GENERAL PROCEDURE FOR SITING WASTE MANAGEMENT FACILITIES

The process of site selection can be defined in stages or levels by which numerous possible sites is reduced to a few probable sites. Involvement of and communication with Charles County and citizens throughout the entire process is essential to provide input for the site evaluation planning parameters, determination of and ranking of site suitability criteria and the matrix evaluation process.

Establish Site Evaluation Planning Parameters as a framework for the site search direction. These parameters should include, but not be limited to, items such as size, service life, major areas excluded, minimum buffer zone requirements, compatible surrounding and adjacent land uses, preferred site distance from centers of development, acreage requirements.

Data Collection of Baseline Information including previous studies and reports and conducting meetings with the interested county departments, citizen groups, and regulatory agencies to discuss the proposed process.

Prepare Land Use Opportunities and Constraint Maps depicting technical, environmental, economic, and socio-economic concerns relevant to solid waste management facility siting.

Identify Primary Potential Solid Waste Management Facility Sites by a "windshield" survey, U.S.G.S. topographic maps, floodplain maps, aerial photographs, plat maps, zoning maps, project planning parameters, meetings with county officials, and regulatory agency representatives.

Develop Screening Criteria taking the planning parameters into account, several key factors may be identified in screening sites. Key factors which are common to solid waste management facilities are that the site should:

- Have a minimum impact on the community
- Be served by adequate road systems
- Be technically sound, environmentally suitable, and economically feasible
- Have the support of elected officials and citizens groups

First Level Screening (absolutes) involves an inherent constraint which does not allow a solid waste management site at the location due to conditions that, if found, would eliminate a site from further investigation. First level screening criteria may include, but is not limited to, highly developed areas, areas within 5,000 feet of a airport runway, areas within the 100-year floodplain, site boundaries with reasonable direct access beyond two miles of a major arterial road or transportation network, national parks, or critical environmental areas.

Develop a Site Feasibility Matrix to rank and provide a comparison of the sites based on the first level screening criteria. The site comparison will provide for elimination of non-feasible sites from further investigation. This site elimination is important as it would be inefficient (time wise and momentarily) to attempt to investigate all the primary potential sites in terms of the level two screening criteria. The end result is a listing of potential sites for further investigation as well documentation of the non-feasible sites and why they were eliminated.

TABLE 4-2

GENERAL PROCEDURE FOR SITING WASTE MANAGEMENT FACILITIES
(continued)

Conduct Field Inspection of the potential sites with county officials and MDE officials.

Second Level Screening (non-absolutes) involves assessing the constraints which, by virtue of their nature, are not absolutely disqualifying. Second level screening is an evaluative process in qualitative and quantitative terms. Criteria for qualitative evaluation include, but is not limited to, buffer, easements, habitat impact, surface water quality impact, archaeological/historical, surrounding land-use, aesthetics (screening) and land ownership. Quantitative criteria are definable in terms of standard engineering practices and include haul distances, access, site size/shape, soils, availability of site resources (cover soil), site drainage, groundwater/aquifer impacts, site utilization, wetlands impacts, well inventory, proximity to sensitive areas, proximity to residential developments, and development costs.

Determine Matrix Rating Methodology for evaluation of the second level screening criteria as a joint effort of the citizens group, and county officials. Two of the more common matrix rating systems used are the ranking method and the rating method.

The rating method simply assigns an unweighted numerical value for each screening criteria (1 - very good, 2 - good, 3 - fair, and 4- poor). The numbers are tallied and the lesser overall total is the most desirable site. This method assumes that each criteria is of equal importance.

The ranking system uses a weighted numerical value for each criteria. The impact factors (1 - negligible impact, 2 - less significant impact, 3 - significant impact, and 4 - most significant impact) are used to reflect the relative value of each screening criteria. The impact factor is then multiplied by the numerical rating criteria to provide a weighted value.

Develop a List of Preferred Sites based on the matrix evaluation of the sites, a selected number of sites should be selected for further analysis.

Conduct a Workshop with the Charles County Commissioners to present the findings and list of preferred sites and the recommendations of the consultant of the final sites for detailed investigation.

Conduct Final Site Investigation of the sites selected for detailed study.

Conduct Public Participation meetings to obtain community input into the decision making process and to present site-specific data obtained in the final site investigation. The Charles County Commissioners shall oversee this meeting.

Final Site Selection shall be made by the Charles County Commissioners based on the final site investigation data, the recommendations of citizens groups, and public opinion. The site will be selected and procured by the Charles County Commissioners.

Adjacent to the Potomac and Patuxent Rivers are low-lying flats not more than 10 to 25 feet above sea level. Steeply-sided terrace formations are often present in these locations as well. These flats vary in width from a few feet where the river current of the Potomac washes strongly against the shoreline, such as is found at several locations in western Charles County near Indian Head and Potomac Heights, to more than a mile in the southern part of the County, such as Allen's Fresh. The interior of the County, along U.S. Route 301 from Faulkner to the Prince George's County line is predominantly flat. Outward from this plateau, dissection becomes more pronounced and the land is gently rolling and hilly. Approximately 65 percent of the County is nearly level or gently sloping, 24 percent moderately or strongly sloping, and 11 percent is greater than 15 percent.

Landfill sites are generally located in topographic high areas, broad flat plateau areas, and areas which do not have steep ridges. Land which has slopes greater than 15 percent is not considered acceptable for landfills due to excessive site grading required to develop the landfill. Other waste management facilities are not as constrained by the slope of the land; however, cost factors associated with site work must be considered.

Low-lying areas along rivers and waterways may be regulated by federal, state, and county laws protecting these areas due to critical areas, tidal wetlands, and non-tided wetlands. Additionally, low-lying areas within the 100-year flood plain are not acceptable for development as a land disposal facility due to state and federal regulations.

4.16.2 Soils

Predominate soil types of Charles County are gravels, sands, silts, and clays. For landfills, the porous nature of the unconsolidated soils does not provide the impervious layer needed to contain leachate within the waste fill area. However, measures such as geomembranes, leachate collection and treatment systems, and monitoring systems aid in reducing the potential for migration of leachate into the environment.

The *Charles County Soil Survey* provides more detailed information on the types and locations of soils within the County which should be used for the initial stages of siting a landfill. Based on this survey approximately 19 percent of the County has soils with slight or moderate limitations for septic systems indicating that these soils are moderately permeable. The remaining 81 percent of the County is mapped as having poor drainage, and permeability. Approximately one-quarter of the County's land area is characterized as tidal marsh and swamp. However, this survey is somewhat limited as it is primarily concerned with the first 5 feet of the soil profile and more information is required before the final site selection decision can be made.

The properties of the soils on which a landfill is sited should be considered in planning, design, construction operation, closure, and post-closure of the landfill. Soil characteristics such as soil texture, erodibility, load-bearing capacity, resistance to slide, permeability, water table elevation, and quantity should be addressed during the site selection process. Impermeable soils are desirable soils for the base of the landfill; however, landfill operations require a loamy or silty soil which is easily spread and compacted for cover material. Soil types for other waste management facilities are those

which can provide adequate support for the building, structure, or concrete pad.

4.16.3 Geologic Conditions

Although landfill facilities can be engineered to be environmentally protective in most geologic settings, it is desirable to have sites in areas in which geologic conditions provide backup attenuation capacity. In Charles County, optimum geologic conditions for a landfill site include adequate depth to groundwater and the presence of a low permeability formation (aquiclude) beneath the site. Geologic conditions should be such that an effective groundwater monitoring system can be established.

The geologic formations beneath Charles County are composed of gravel, sand, silt, and clay. These materials have been transported by streams, particularly the Potomac River, from the Appalachian and Piedmont region west and north of the County throughout the geological history of the County and were deposited in the form of alluvial fans and deltas. Tidal and marine muds and silt layers overlay dense, hard crystalline, metamorphic and igneous rocks of Precambrian age. The crystalline rocks are deep below the surface. Diatomaceous deposits are unique to this part of the state and are found throughout the County.

In the vicinity of Faulkner, there are unique surficial sediments which are a relatively young, thin veneer approximately 30 feet in thickness, occupying elevations of 30 feet above mean sea level and consisting of gravel, sand, and silt. These sediments were deposited by the eastward flowing Potomac River as the river migrated slowly southeastward to its present location. Beneath this granular deposit is the Calvert formation of the Chesapeake Group which is composed of the Fairhaven and Plum Point Marls. This formation overlies and tends to seal the surficial granular deposit from all of the older geologic units.

4.16.4 Location

Locating a site for a solid waste management facility involves the interaction of regulatory, environmental, technical, economic, and socio-political considerations. General regulatory, legal (laws), environmental, technical, and economic concerns for siting a waste management facility are discussed in other chapters of this plan. Socio-political considerations are dynamic and volatile. Charles County encourages and provides procedures and policies for public involvement in considerations associated with proposed solid waste management facilities within the County. In summary, the location of a solid waste management facility is governed by engineering, technical, and economic considerations which are generally straightforward with little controversy. As stated previously, these concerns are addressed in other sections of this Plan. The socio-political issues are very dynamic and are a function of historic and recent events within the County. The variables for siting solid waste management facilities are that of socio-political issues which are constantly changing and are not easily documented.

4.16.5 Aquifers

The geologic formation underlying Charles County are sedimentary sands and gravels, capable of yielding substantial quantities of fresh water. There are five major water-bearing aquifers located in Charles County which slope from west to east. These aquifers are found in the Patuxent, Patapsco, Raritan and Magothy formations of the Cretaceous system, the Aqua Greenstone of the Eocene series, and in the Pleistocene deposits. Contamination of the aquifers within Charles County is a possibility due to geology of the area, and the numerous recharge areas.

4.16.6 Wetlands

Wetlands are of major importance to ecosystems in the County and Chesapeake Bay. The County has approximately 139,800 acres of wetland areas, of which approximately 81 percent are tidal and the remaining 19 percent are non-tidal. The tidal wetlands provide a transition zone between dry land and open water. Non-tidal wetlands are referred to as inland or upland wetlands and included swamps, bogs, and hardwood forests. Solid waste management sites should not encroach upon, or negatively, impact wetlands.

4.16.7 Surface Water and Floodplains

Charles County is bordered by the Patuxent, Potomac and Wicomico Rivers, and has three lakes or reservoirs within the county limits with a surface area of approximately 171 acres. The three lakes, Jamesian, Trinity, and Wheatley were constructed for flood control as part of the Gilbert Run Swamp improvements. The use of the Patuxent, Potomac or Wicomico Rivers as a water source is constrained by their salinity concentrations.

Along these rivers are areas associated with the 100-year flood plain. Facilities located within the 100-year floodplain may hinder the flow, reduce the temporary storage capacity of the floodplain, or wash out the waste within the landfill and endanger human health and the environment.

Floodplains are not suitable for siting solid waste management facilities within Charles County. Federal regulations (*CFR* 40) contains provisions banning the location of solid waste facilities within 100-year flood plains. Additionally, Charles County's Floodplain Management Program establishes floodplain districts within the County and provides for the issuance of permits, and imposes regulations on construction and development within these districts.

4.16.8 Water Quality

As described above for aquifers and surface waters, poorly sited, designed or managed solid waste disposal or processing facilities can cause water quality degradation. While current federal and state regulations and criteria for these facilities require design features to mitigate for potential water quality impacts, it is important, where possible, to site such facilities where they pose the least risk to drinking water supplies and other sensitive water resource areas.

As stated in the *Charles County Comprehensive Plan*, it is critical that the County improve and maintain water quality in the coastal, estuarine, and upper basin tributary streams. The County's policy considerations addressing water quality issues include:

- Ensure that point source discharge of pollutants are maintained at safe levels of environmental quality through strict enforcement of state water quality standards for point source discharges.

- Establish effective shoreline erosion-control regulations and work with state and federal agencies to identify and stabilize existing problem areas.

- Protect the County's finfish and shellfish areas by requiring full compliance with state and federal regulations relating to discharge into Class I and Class II waters.

- Encourage the establishment of soil conservation and water quality plans on all farms in Charles County to reduce sediment and nutrient export from agricultural activities.

- Strengthen stormwater management regulations to addresses both quantity and quality control of runoff and incorporate urban best management practices for sites undergoing development or redevelopment.

- Identify and map important aquifer recharge areas and develop protection measures to maintain the quality and quantity of these resources.

- Conduct a thorough analysis to determine the feasibility of developing surface water impoundment sites for potable water, storm water management, recreation, and/or fire flow.

- Continue to implement the recommendations of the *Patuxent River Policy Plan*.

- Continue to implement the recommendations of the *Charles County Comprehensive Water and Sewage Plan.*

Prior to the establishment of any solid waste management facility in Charles County, each of these water quality issues should be considered.

4.16.9 Adjacent Incompatible Land Use

Solid waste management facilities have the potential to create odor, noise, dust, and/or adverse traffic impacts for adjacent land users. Charles County is aware of the problems and nuisances which may be created by solid waste management facilities. The *Charles County Zoning Ordinance*, *Charles County Comprehensive Plan*, and requirements for public notification of potential new solid waste management facility locations will aid the County in reducing the possibility of adjacent incompatible land uses.

Similarly, new developments or land uses adjacent to existing solid waste management facilities must consider potential impacts due to any existing solid waste facility.

4.16.10 Airports

The U.S. Department of Transportation, *Federal Aviation Authority Order 5200.5, FAA guidance Concerning Sanitary Landfills on or Near Airports* stipulates the following criteria for sanitary landfills.

- Waste disposal sites may not be located within 10,000 feet of any runway end (used or proposed) to be used by a turbine powered aircraft.

- Waste disposed site may not be located within 5,000 feet of any runway end used only by piston powered aircraft.

- Waste disposal sites may not be located within a 5-mile radius of a runway end that attracts or sustains hazardous bird movements from feeding, water, or roosting areas into, or across the runways and/or approach and departure patterns of aircraft.

4.16.11 Hospitals

The *Annotated Code of Maryland* Environment Article, Section 9-225 prohibits the location of any landfill within a 0.5 mile radius of any hospital.

4.16.12 Planned Growth Patterns

The *Charles County Comprehensive Plan* is the planning document designed to plan and direct the development of growth patterns within the County. The planned growth pattern is supported by the *Charles County Zoning Ordinance*.

Planning for land use and growth management in the County will provide the necessary guidance in siting solid waste management facilities. Using the County's development and growth management plan as a basis to site solid waste management facilities, provide assurance that projects do not impact or nullify the County's long-term objectives.

4.16.13 Areas of Critical Federal, State, or County Concern

Critical concern areas established by the State of Maryland are classified into three categories:

- The first category includes those areas which can tolerate little or no interference from human activity due to physical or regulated constraints. This category includes marshes or endangered species habitats.

- The second category comprises conservation areas in which development that does not

adversely impact the area, is allowed. Areas such as historic places or recreational areas are included.

C The third category includes lands which are designated for some future use. Generally, such sites are vacant and are designated as such due to its unique location or situation.

The development of a landfill within areas of critical federal, state, or county concern is not allowed due to regulatory requirements. However, certain solid waste management facilities may be located in these areas, provided the facility does not adversely impact the area. For example recycling drop-off centers may be located within parks. Charles County has several areas considered to be of critical concern. These areas are discussed in the following paragraphs.

4.16.14 Chesapeake Bay Critical Area

The Maryland General Assembly adopted the Chesapeake Bay Critical Area Law in 1984. The law requires that Charles County adopt and implement a critical area management program to protect the water quality and wildlife habitats of the Bay and its tributaries. The County is preparing a development guidance system for critical area growth allocations. The critical area is defined as the land along the tidal shoreline extending 1,000 feet inland of mean high tide or the landward boundary of tidal wetlands.

4.16.15 Zekiah Swamp Management Area

The Zekiah Swamp originates in Southern Prince George's County and flows through Charles County forming the headwaters of the Wicomico River. The Zekiah Swamp is part of the watershed of the Wicomico Scenic River, originally designated in 1968 by the Maryland Legislature. The Smithsonian Institution in conjunction with DNR described the Zekiah Swamp as one of the most important ecological areas on the East Coast and the largest natural hardwood swamp in Maryland.

4.16.16 Patuxent River

The County is participating with neighboring counties which border the Patuxent River in protecting the river's resources through land management strategies to control pollution within the watershed. The County was able to acquire an agricultural preservation easement on 222 acres through the State Agricultural Preservation Program and 615 acres with the State Open Space Program.

4.16.17 Parks

Additional areas of critical concern include national, state, and county parks which are located throughout the county.

- Cedarville State Park
- Oak Ridge Park
- General Smallwood State Park
- White Plains Regional Park
- Doncaster State Forest
- Gilbert Run Park

- La Plata
- Mattawoman Natural Environmental Area
- Myrtle Grove Wildlife Management Area
- Ruth B. Swan Memorial Park
- Tilghman Park
- Strawberry Hills Park
- Thomas Stone National Park
- Laurel Springs Regional Park
- Mattingly Park
- Piscataway National Park
- Southern Park
- Benedict Community Park
- Pinefield Park
- Friendship Farm Park

4.17 COMPREHENSIVE PLAN REQUIREMENTS

Charles County Comprehensive Plan is a general guidance tool and is not intended to provide specific guidelines concerning solid waste management. The Plan has established guidelines for the County to develop an integrated solid waste system. In general, the Plan encourages the search for short- and long-term solutions for solid waste management. The Plan has established guidelines for the County to develop an integrated solid waste management system. It implies no discouragement from future consideration of new technologies not addressed within it, or of new developments in existing technologies that at present are not recommended, provided they are consistent with goals and objectives of the *Charles County Comprehensive Solid Waste Management Plan*.

4.18 ZONING REQUIREMENTS

Charles County has recognized that solid waste management technologies are in a process of development and evolution. While land filling was the primary mode of solid waste management in past decades, today it is only one component of solid waste management. Solid waste management encompasses waste-to-energy facilities, recycling facilities, reuse facilities and composting facilities, in addition to the more traditional landfills. As the County moves towards the twenty-first century, the need for warehousing facilities, separation and processing facilities, transfer stations, holding and temporary storage facilities, waste-to-energy facilities and compost facilities all may play an important role in current and future solid waste management practices. As technologies and practices evolve, the *Charles County Zoning Ordinance* may need to be revised and amended. Nevertheless, the objectives of the code will remain as stated above, and the County will endeavor to retain flexibility in its zoning provisions in recognition that facilities/processes and the property on which they are located can be tailored to become compatible with a wide variety of surrounding land uses.

4.18.1 Permissible Uses

Section 62 of the *Charles County Zoning Ordinance* states that "Uses such as incinerators, private prison, private landfills and rubblefills, toxic and hazardous waste disposal facilities, private sludge storage facilities, and other uses that have similar impacts that are not listed on the Table of Permissible Uses are not allowed."

4.18.2 Minimum Zoning Standards

The *Charles County Zoning Ordinance Article IX: Minimum Standards for Special Exceptions*

and Uses Permitted With Conditions reflects the items in Table 4-3. The minimum standards supplement the base requirements for the zone in which the proposed use is located. The intent of the standards is to minimize the potential impacts which the solid waste management facility may have upon adjacent properties. Items such as minimum setbacks, buffer requirements, hours of operation, security (perimeter fencing), provisions for traffic access, and utility services are addressed.

TABLE 4-3
MINIMUM ZONING STANDARDS

Section 7.06.000 - Pozzolan management facility.

This use is permitted by Special Exception in the AC, RC, IG and IH Zones subject to the following:

(a) *Minimum Area:* 20 acres when the site is in the IG or IH Zones and is completely surrounded by the IG, IH, or BP Zones**.** 50 acres when the site is in the AC, RC, IH or IG Zone and not completely surrounded by the IG, IH, or BP Zones.

(b) The Board of Appeals will establish a maximum time limit on the approval of the application. Extensions of specific periods may be granted if a new Special Exception is applied for and no substantial adverse impact is found in the continuation of the use.

(c) All fixed installations shall be located at least 750 feet from any existing homes and shall not be less than 300 feet from any property line. However, in the case where the site is completely surrounded by the IG, IH, or BP Zones, the fixed installations shall not be less than 100 feet from any property line.

(d) Roads for ingress and egress from the site to public roads shall not be less than 20 feet wide, and shall be hard-surfaced, and shall be maintained for a distance of 150 feet from the public road into the site. All other roads shall be treated as needed to control dust. For any roads which cross a utility right-of-way, the applicant shall obtain a permit for the crossing from the utility company and shall submit copies of the permit with the Special Exception petition.

(e) Operation hours shall be established by the Board. The Board may establish hours of operation based on the impact of noise, traffic, and operation of the use on the surrounding community.

(f) A site plan shall be submitted for approval to the Board with the application, showing the following:

i. Setback area, including screening and fencing.

ii. Portion of tract being used.

iii. Existing and proposed structures and major mechanical equipment.

iv. Existing and proposed access roads.

v. Water supply and sewage disposal.

vi. All necessary pollution control measures.

vii. Stockpile areas and height.

viii. Points of access to the site and provisions to control unauthorized entry to the site along the entire perimeter.

TABLE 4-3
MINIMUM ZONING STANDARDS (continued)

xii. The Board may request that an environmental impact analysis be submitted by the applicant.

xiii. All operations on site, including outdoor storage of machinery and equipment, may be required to be screened from any adjoining land or public street.The applicant shall submit plans showing the location and type of any proposed screening material.

xiv. Leachate collection system discharge point be shown if applicable to the site.

g. All operations shall be conducted in a safe manner with respect to hazard to persons, physical or environmental damage to lands and improvements and all operations shall minimize damage to any street, bridge, or public right-of-way. The Special Exception permit holder shall immediately report to the Board any non-pozzolan residuals in the material being landfilled. The land filling of such residuals may be ground for suspension or revocation of the Special Exception. The escape of any pollutants into the air, ground water or surface water beyond the site, shall require immediate disclosure to the appropriate state regulating agencies, and may be grounds for suspension or revocation of the Special Exception.

h. The applicant must demonstrate conformance with the standards in Article II Sections 31-34.

i. A sediment and erosion control plan shall be reviewed and approved by the Charles County Soil Conservation District.

j. A post-use land reclamation plan reviewed by the Charles County Soil Conservation District and approved by the Charles County Department of Planning and Growth Management is required prior to the commencement of any activity on site.

k. There shall be no land filling within a minimum of 200 feet of any surface water including springs, seeps, or intermittent streams. This buffer shall be modified for steep slopes and soil conditions in the same manner as the Resource Protection Zone is modified in Article VIII. Any existing Pozzolan management facilities are exempt from this requirement; however, the expansion or extension of any existing facility must comply.

l. The maximum number of truck loads hauled to or from a site shall not exceed the following:

Site of more than 100 acres	10-200 loads per day
Site of 51- 100 acres	20-150 loads per day
Site less than 51 acres	100 loans per day or less

The Board may reduce the maximum loads per day after weighing factors such as haul roads, routes, traffic patterns, number of trucks, nature of the community, and proximity to schools, churches, businesses, and inhabited dwellings.

The Pozzolan must be hauled wet so as to prevent any airborne material from escaping from the container.

In the case of sites adjoining or in close proximity to the generation plant, hauling on public roads shall be minimized.

TABLE 4-3
MINIMUM ZONING STANDARDS (continued)

m. A plan to reclaim or mine the Pozzolan may be included and approved with the application. An approval to reclaim or mine the Pozzolan shall expire five years from the date of approval unless renewed as specified in Section 415. If mining the Pozzolan is not approved as part of the original application, a mining plan may be submitted subsequently as a modification to the Special Exception provided all the submittal requirements of use 7.05.110 surface mining of more than 10 acres are met.

n. Only Pozzolan created as a by-product of a power generation facility located in Charles County may be utilized by Pozzolan management facilities located in the County.

o. Compliance with all applicable local, State or federal laws, regulations or permitting requirements including Section 7-464 of the Natural Resources Article, Annotated Code of Maryland, as amended. No Special Exception for a Pozzolan management facility shall be valid unless all necessary operating permits are obtained including an NPDES permit, if necessary.

CHAPTER 5

SOLID WASTE MANAGEMENT PLAN OF ACTION (2000 - 2010)

5.1 INTRODUCTION

Chapter 5 presents the recommended actions to be taken and an implementation schedule for the planning period to effectively meet the goals and objectives presented in Chapter 1. The recommended technologies and management programs are based on the evaluations presented in Chapter 4. This Plan presents an overall framework for managing solid wastes projected to be generated in Charles County in the next 10 years. The goals and objectives are to be achieved through an integrated solid waste management program based on the following hierarchy of management alternatives: source reduction, recycling, yard waste composting, and land disposal.

The Charles County's Comprehensive Solid Waste Management Plan must respond to the requirements of the state-mandated recycling goals and all other federal, state and county regulations and laws. The goals and objectives presented in Chapter 1 address these requirements. Additional objectives that exceed regulatory requirements, or address areas not specifically covered by regulations will also be addressed in this chapter.

An integrated solid waste management plan provides specific management tools to handle the various components of the waste stream. The program elements are interrelated; modification to one element invariably impacts all elements of the Plan. For instance, the waste reduction and recycling rates directly impact disposal capacity projections for the landfill. The numerous programs which comprise the Plan are used in combination to compliment each other. This Solid Waste Management Plan identifies the programs and also addresses how and when these programs will be implemented.

The *Action Plan* is not intended to provide specific information such as manufacturers, models of equipment to be purchased, or specific sites to be used for required solid waste management facilities. Rather, it provides county decision-makers with a framework upon which to base these decisions during the planning period. The Plan is a dynamic document that must be continuously updated to reflect changing conditions and management decisions that will be made when sufficient additional data is available. Implementation of the Plan will be facilitated through a proactive public information and public participation program.

5.2 ACTION PLAN OVERVIEW

The recommended schedule and funding scenarios for the *Charles County Solid Waste Management Program* for the years 2000 through 2010 are summarized in Tables 5-1 and 5-2, respectively. Detailed descriptions of plan elements are presented in the following sections of this chapter. Table 5-1 presents a detailed summary of milestones and action items, and corresponding implementation dates, that will be required to effectively attain the goals of the integrated program. As previously noted, the schedule will be periodically revised and updated throughout the planning period as elements are implemented.

TABLE 5-1

RECOMMENDED SOLID WASTE MANAGEMENT ACTION PLAN SCHEDULE 2000-2010

Program or Facility	Description	Date
Source Reduction Program	1. Continue to produce brochures, reference documents; public meetings for citizens and businesses on alternatives available for waste reduction 2. Continue technology transfer, public education program	July 2000 -2010 2000-2010
Solid Waste/ Recyclable Collection	1. Continue the licensing/volume-based billing system feasibility study 2. Continue meeting with haulers 3. Implement recommended program 4. Examine feasibility of a franchising pilot program 5. Collection system evaluation	2000-2010 2000-2010 2000-2010 2000-2010 Annually
Residential Recycling	1. Expand curbside collection program 2. Continue to evaluate additional drop-off centers	2000-2010 2000-2010
Commercial Recycling	1. Produce, distribute business recycling informational materials 2. Continue commercial recycling education program 3. Continue to evaluate reporting system; develop alternatives for improvement, as necessary 4. Coordination of joint business recycling programs	2000-2010 2000-2010 2000-2010 2000-2010
MRF	1. MRF feasibility study; confirm recycling plan assumptions.	2000-2010
Rubble Recycling	1. Meetings with contractors on benefits of rubble recycling 2. Meeting with contractors and haulers to initiate rubble MRF feasibility study	Jan 2001 Feb 2001
Municipal Sanitary Landfill	1. Begin operation of Cell I 2. Construction/operation of Cell II 3. Construction/operation of Cell III 4. Continue to explore the feasibility of the use and/or sale of methane gas.	July 1994 2003 2010 2000-2010
Yard Waste	1. Waste prevention/backyard composting publicity program 2. Meet with farmers to evaluate agricultural reuse opportunities	2000-2010 2000-2010
Sludge	1. Evaluate the expansion of sludge stabilization facility at Mattawoman WWTP	2000-2010
Household Hazardous Waste	1. Continue semi-annual household hazardous waste collection day using temporary facilities and trailers 2. Evaluate feasibility of incorporating permanent household hazardous waste receiving facility at the new landfill	2000-2010 March 2001
Other Solid Wastes	1. Waste oil and antifreeze should continue to be collected at the drop-off centers and the NIES recycling program. Institute semi-annual update listing for county oil and antifreeze acceptance facilities; publicize list through media	2000-2010
Legislative Initiatives	1. Amend county polices for solid waste management as needed 2. Modify zoning regulations for solid waste facilities	2000-2010 2000-2010
Financing	1. Reevaluate the tipping fee annually	2000-2010
Illegal Dumping and Litter Control	1. Continue the development and implementation of the Environmental Crime Task Force	2000-2010

Cost estimates and projections presented in Table 5-2 are based upon Charles County Solid Waste Department budgets and "rule-of-thumb" parameters for the various components of the Solid Waste Plan. The data is not intended to represent a highly accurate projection of the tipping fee over the planning period. This evaluation is used to compare the overall impact of alternative management strategies on program costs over the planning period. Many scenarios were considered during the formulation of this Action Plan. Appendix H presents the assumptions that were used in preparing Table 5-2; also included are four additional scenarios that illustrate the relative impact of variables such as the recycling rate on the capacity of landfill and program costs.

Source reduction through decreasing the volume of materials produced, consumed and disposed, as well as through reuse of materials, will be the highest priority solid waste management alternative for Charles County. Source reduction decreases the potential environmental impact of solid waste management, and can result in significant cost savings to the community. In addition, reducing the volume of waste results in the deferment of capital expenditures for recycling, processing, and disposal equipment and facilities.

Along with source reduction, Charles County plans to expand the recycling program, with a goal of 35 percent by the year 2003. The County will build upon existing recycling programs, and work to expand residential, commercial/industrial, and institutional recycling and yard waste composting. Effective implementation of this Plan will require the cooperative effort of officials of the county and municipal governments, federal installations, waste industry personnel, and waste generators within the County.

The proposed management alternative includes county-financed expansion of the Charles County Landfill. The County will conduct a feasibility study to evaluate a material processing facility (MRF) to process collected recyclables.

Table 5-2 provides a detailed summary of the projected facility capacity requirements, anticipated amount of recyclables recovered through the recycling and composting programs, and expenditures for the 10-year planning period. The revenue neutral fee required to fully finance the solid waste program is projected to vary from $58 to $92 per ton of waste disposed in the landfill. This fee reflects the costs of operating the landfill, the recycling program, yard waste composting program, and sponsoring an annual household hazardous waste collection day. The County currently charges a tipping fee of $57 per ton at the landfill and an environmental service fee of $62 for improved properties. The environmental service fee funds the recycling program, composting program, and the annual household hazardous waste collection day.

TABLE 5-2

RECOMMENDED SOLID WASTE MANAGEMENT PLAN
ACTION PLAN FINANCING
Fiscal Year 2000-2005

	FY00 Budget	FY01 Budget	FY02 Estimate	FY03 Estimate	FY04 Estimate	FY05 Estimate
Revenues:						
Permits	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400
Tipping Fees	1,820,000	2,058,600	2,141,100	2,183,900	2,227,600	2,272,100
Tag-A-Bag	85,000	92,500	94,400	96,300	98,200	100,200
Miscellaneous/Interest/Etc.	500	0	0	0	0	0
Fund Balance Approp.- Pisgah	301,100	299,900	299,900	299,900	299,900	299,900
Capital Reserve for Replacement		376,300	470,000	670,000	85,000	0
Total Revenues	$2,208,000	$2,828,700	$3,006,800	$3,251,500	$2,712,100	$2,673,600
Expenses:						
Salary & Fringe	$478,900	$519,100	$542,500	$566,900	$592,400	$619,100
Operating	281,500	279,900	291,100	302,700	314,800	327,400
Capital\Equipment	2,500	397,700	472,500	672,500	87,500	2,500
Operating Contingency	175,100	351,100	340,100	348,700	356,700	363,900
Capital Reserve for Replacement	90,000	102,000	102,000	102,000	102,000	102,000
Debt Service: Bond P & I	165,900	166,000	165,900	166,000	166,000	166,000
Transfers Out: Pisgah Closure	301,100	299,900	299,900	299,900	299,900	299,900
Total Expenses	$1,495,000	$2,115,700	$2,214,000	$2,458,700	$1,919,300	$1,880,800
Landfill Capital Fund:						
Cell I Closure	$141,800	$141,800				
Cell I Post Closure Costs	79,900	79,900				
Cell II Construction	491,300	491,300				
Cell II Closure & Post Closure Costs			198,600	198,600	198,600	198,600
Cell III Construction			594,200	594,200	594,200	594,200
Total Pay-go	$713,000	$713,000	$792,800	$792,800	$792,800	$792,800
Surplus\Deficit:	$0	$0	$0	$0	$0	$0
Estimated Unreserved End of Year Fund Balance:	$1,282,375	$957,275	$997,475	$1,046,275	$1,103,075	$1,167,075
Expected Billable Tonnage:	31,930	36,116	37,563	38,314	39,080	39,862

5.3 WASTE STREAM CHARACTERIZATION

Charles County will research other waste stream characterization studies to establish the required database for the effective planning of collection and waste management facilities. The assessment will include an evaluation of the quantity, composition and source of waste generated within the County. Sources to be characterized will include residences, businesses, and institutions. Ultimately, the characterization will include surveys and interviews with generators and waste management officials to more accurately determine the quantities of waste imported and exported from the County, and the breakdown of residential versus commercial waste. The waste characterization will address all disposal and processing facilities within the County, including the landfill, yard waste composting site, and recycling drop-off centers. Random samples of incoming loads will be obtained, and the following waste fractions will be characterized:

- Aluminum/non-ferrous metal
- Ferrous metal
- Glass
- Plastic
- Newspaper
- Cardboard
- Newspaper
- Yard waste
- Other organics
- Rubber
- Textiles
- Wood
- Household hazardous waste
- Wood

Waste stream characterization studies will be conducted throughout the planning period as programs are implemented, and more specific data is required to evaluate the effectiveness of components of the integrated solid waste management plan.

5.4 SOURCE REDUCTION

Source reduction will become an increasingly important component of the Charles County solid waste management program. Reduction of the amount of waste generated will extend the useful life of the County landfill and reduce expenditures required for collection, recycling, and disposal programs. Source reduction programs generally fall into the following categories: product reuse, reduced material volume, reduced toxicity, increased product lifetime, and decreased consumption. Examples of source reduction alternatives are presented below.

Buying in Bulk	*Reusable Drink Containers*	*Waste Exchange (Swaps)*
Cloth Diapers	*Minimizing Packaging*	*Double-Sided Copying*
Repairing Broken Items	*Buying Durable Products*	*Junk Mail Reduction*
Donating Clothing	*Mulching Mowers*	*Reusable Air Filters*
Cloth Shopping Bags, Lunch Bags	*Repairing Pallets* *Printer Cartridge*	*Reduce Use of Disposable Cups, Plates*
Drink Concentrates	*Remanufacturing*	*Hand Driers*

Source reduction will be encouraged through a publicity campaign designed to keep citizens aware of the available options. Public information booklets and presentations have been prepared to identify available source reduction methods. The campaign will emphasize the benefits of source reduction and identify source reduction as the highest priority waste management tool for Charles County. The Charles County Department of Public Facilities will continue its publicity program on the benefits of mulching mowers and backyard composting.

The County has implemented a waste exchange program with a private non-profit organization. The waste exchange facility would accept types of wastes that could potentially be reused by other consumers rather than disposed of in the landfill, including paint, toys, sports equipment, clothes, furniture, and appliances. The waste exchange is a functional relay, staffed by the Charles County Women's Club.

Source reduction can be implemented through education and research, financial incentives and disincentives, and by regulation. In Charles County, source reduction will be primarily implemented through voluntary public participation. The source reduction program is designed to make citizens and businesses aware of the options available to reduce the generation of waste, as well as the benefits and cost advantages. The program will include production and distribution of additional informational materials, and conducting educational seminars for homeowners and commercial establishments. For example, topics will include backyard composting and "green shoppers lists" for buying environmentally friendly products.

Providing financial incentives for source reduction on a county-wide basis will also be evaluated. The County has initiated a volume-based billing system for waste hauled to the landfill or the designated drop-off locations. Alternatives available for expanding the program include tax credits/exemptions, product disposal charges, and volume-based billing for all waste collected within the County. Governmental agencies and businesses can reduce waste through measures such as double-sided copying, reuse of scrap paper, and implementing a procurement policy that encourages the minimization of packaging.

5.5 COLLECTION (SOLID WASTE AND RECYCLABLES)

Residential waste is currently collected by private haulers in the unincorporated areas of the County; La Plata and Indian Head provide municipal collection. Commercial and institutional establishments contract with the hauler of their choice. Recyclables are collected separately in selected areas by haulers that contract directly with the County.

The institution of a licensing system is recommended in order to give the County more control over haulers' services, such as requirements for recyclable collection, record keeping, and billing methods. This system would provide for county flow control and accounting of recyclables, while affording haulers and residents the advantages of a "controlled" free-enterprise system. This system should give the County positive control over collection systems that may be needed to meet recycling goals.

Implementation should begin with a feasibility study to determine the standards and policies for licensing haulers. Elected officials from incorporated municipalities should make a decision early in the process about whether or not their jurisdictions will be included. A committee representing private haulers should

be consulted during the planning process to develop a system that will best serve the needs of the community.

Standards and policies for the licensing system should address the following requirements:

- Qualifications for company owners
- Collection frequency and hours
- Billing procedures
- Point of collection, containers
- Vehicles and equipment
- Personnel training
- Requirements for collection of recyclables, including yard waste
- Bulk item pick-up

Once the licensing procedure has been established, the implementation of a volume-based billing system is recommended. Municipalities throughout the country have invariably found that volume-based billing results in significant waste reduction and increases in recycling quantities. Volume-based billing means that the residential or commercial customer is charged based on the number and size of containers put out for collection each week. In a "pay-by-the-can" system, standardized collection containers are issued, with a set monthly collection fee associated with each size. Stickers can be purchased for any excess waste placed in bags. Volume-based billing encourages waste reduction and recycling, minimizes the size and number of disposal containers, and reduces costs. The system provides a direct economic incentive for citizens and businesses to reduce the amount of waste that they generate.

Institution of a volume-based billing system can result in some increase in illegal dumping to avoid increased collection fees. This practice can be minimized by providing convenient outlets for all residents to recycle, and also through an effective public information program that reinforces the attitude that illegal dumping is a socially unacceptable practice. The County's Environmental Crimes Task Force program, "Catch A Dumper," is an essential element for minimizing illegal dumping and littering. If illegal dumping is found to increase, the County will consider adding additional enforcement personnel and increasing penalties for offenders.

The County may also implement a limited pilot program to evaluate the feasibility of franchised collection. A pilot franchised collection district may be established in an unincorporated area of the County. The franchise would be awarded to a private hauler based on competitive bidding. The limited pilot program could include volume-based billing and economic incentives for recycling. The pilot program could provide a good data base for the evaluation of the cost-effectiveness of the existing free enterprise system, and the effectiveness of volume-based billing.

5.6 RECYCLING

Based on the goals and objectives of the 1994-1999 Solid Waste Plan, the County intended to incrementally increase its recycling rate to 25 percent or more by the year 2004. As of December 1999, the Charles County had an estimated recycling rate of 29%.

5.6.1 Residential Collection

Approximately 10 percent of the residential waste (excluding yard waste) generated in Charles County was recycled during the first six months of 1993. The residential recycling rates continue to increase to a rate of approximately 30 percent by the year 2000. The effectiveness of the existing program will need to be improved to accommodate the increased volume of recyclables. The collection system expansion and increased effectiveness will provide increased opportunities for yard waste collection. This is important due to the increased volume of yard waste to be composted over the planning period.

The County has taken the following steps to expand the effectiveness of the residential recycling program:

- Expanded the curbside collection program participation to 30%-40%.
- Expanded the areas covered by curbside collection, as recommended by the feasibility study.
- Established additional recyclable drop-off center locations.
- Expanded the public information and education program.

Charles County recycled approximately 36,266 tons of residential and commercial solid waste in 1999 through implementation of the programs described above. If necessary, additional options to increase participation and residential recycling rates will be developed and evaluated, including:

- Financial incentives
- Decreased collection frequency
- Mandatory recycling
- Landfill disposal bans
- Recycling of additional types of materials

5.6.2 Commercial, Industrial and Institutional Recycling

Offices, stores, institutions, and industries typically generate 30 to 40 percent of the municipal solid waste stream in a community. As documented in Chapter 3, approximately 33 percent of Municipal Solid Waste generation in Charles County can be attributed to commercial/institutional sources. Commercial recycling is inclusive of commercial, industrial, and institutional sources (excluding yard waste). The county recycled over 56 percent of commercial solid waste in 1999.

An effective commercial recycling program is critical to meeting diversion rate objectives. Commercial wastes contain a high percentage of recyclable materials, including corrugated cardboard (10 to 15 percent), office paper (20 to 40 percent), glass, aluminum, tires, ferrous metals, and landscaping debris. The high percentage of recyclable materials within the commercial waste stream provides an excellent opportunity for increasing the current commercial recycling rate. The County plans to gradually increase the commercial recycling rate from 30 percent in 2000 to approximately 40 percent in 2010. Charles County's business community strongly supports channeling as many programs as possible through the private sector. That philosophy, combined with limited public funds, means the County's emphasis will

be on privately provided recycling collection and marketing. The County will serve mainly as a vehicle for education and coordination of the various business sectors to increase commercial recycling.

As the majority of commercial and institutional establishments are located within the municipalities and federal installations, the success of commercial recycling will depend heavily on the effectiveness of their programs. The Charles County Department of Public Facilities will work closely with the municipalities and the Naval Surface Warfare Center to implement and expand programs within their limits.

Municipalities will be encouraged to contact commercial establishments to:

- Explain the program and elicit support.
- Distribute the County's educational literature on waste reduction and recycling.
- Provide follow-up to encourage implementation of the program and provide assistance.
- Serve as a liaison between the County's recycling coordinator and commercial establishments.
- Obtain data on waste generation and recycling.

Strategies for accomplishing additional commercial recycling throughout the County included:

- Production of a Business Recycling Brochure. This brochure will summarize how to start-up recycling programs, including waste audits, market information, government and private resources, etc.
- Organization of an Annual Business Recycling Forum.
- Assessment of Existing Business Recycling. The County, in preparation for reporting recycling information, will develop a tracking system to determine the extent of business recycling. An assessment of areas (regional and type of business) that are not recycling will be compiled and a strategy developed to expand recycling in those areas.
- Coordination of Business Efforts. Based on the results of the assessment, the County will begin coordinating the stimulation of recycling efforts where they are lacking. This could include bringing together individual businesses in shopping centers/industrial parks/towns to jointly recycle.

5.6.3 Material Recovery Facility (MRF)

The County will consider conducting an MRF feasibility study to determine if this type of facility will aid in meeting or surpassing the goals of the Solid Waste Management Plan. The evaluation will examine the materials for recycling and the type of facility configuration (level of mechanization, etc.) needed. An updated market survey for recycled materials may be conducted; the survey will enable the county to effectively evaluate private sector proposals in comparison to projected public ownership and operation costs. The study will include an evaluation of the need for flow control to improve the economic feasibility of the proposed MRF.

The size and level of technology depends directly on recycling targets, collection methodology, and types of materials chosen for recycling.

As presented in Table 5-2, the County's action plan to achieve a 35 percent reduction in waste disposal will not require a county MRF. A low-technology MRF would include, at a minimum, storage bins and roll-offs, a baler, a glass crusher, and a conveyor line for hand sorting. Charles County does not estimate the need for an MRF during the planning period discussed in this document due to the current achievement of set recycling goals. The additional capital expenditure would not be economically feasible for the desired result.

5.6.4 Rubble Recycling/Processing Facility

Charles County will encourage the establishment of a rubble recycling/processing facility within or in close proximity to the County. Such facilities currently exist within several of the private sand and gravel mining sites. These sites act as a rubble material recovery facility and/or a facility to shred the rubble (including used concrete) to be reused as aggregates or in the production of concrete. These materials could also be used as an alternative daily cover material for the landfill. These facilities and possible future facilities could significantly reduce land disposal capacity requirements for county-generated rubble. Future facilities can be either publicly or privately owned and/or operated. The most economically viable location for the facility will be on the site for a new rubble landfill within the county. It is the County's ultimate objective to landfill only those construction and demolition waste materials that cannot be effectively reused or recycled.

In the future, the County hopes to conduct a feasibility study that will address technologies to be employed, facility location, materials to be recycled, markets, and public information requirements. The feasibility study will be initiated by a meeting with contractors and haulers, and their input will be solicited throughout the evaluation process. The waste characterization study, previously described, will provide the database to determine types and capacity of required equipment and facilities. The county will evaluate the feasibility of establishing a material reuse center at the facility, in which used or off-spec construction materials can be accumulated and used directly by other contractors or homeowners. This could include such items as cabinets, doors, plumbing fixtures, electrical and heating supplies, windows and hardware.

At a minimum, the rubble MRF should recycle wood, paper, cardboard, asphalt, concrete, and metal. Other waste categories that will be evaluated for recycling include drywall, other masonry wastes, packing materials, clean fill and topsoil. The rubble MRF will require the following equipment, at a minimum:

- Front-end loaders
- Concrete/asphalt crushing plant
- Stump grinder
- Tub grinder/shredder
- Magnetic separators
- Vibrating screens/trommel screens
- Storage pad/bins
- Paved sorting area and/or conveyor sorting line

In order for a rubble recycling facility to be successful, an effective public information program must be implemented to educate contractors on the merits and mechanisms for rubble recycling. The county will encourage contractors to separate recyclables at construction and demolition sites, on a voluntary basis.

Implementation of the program will begin with a feasibility study to evaluate markets for recycled materials, types of materials to be recycled, processing technologies, facility siting, and collection alternatives. The feasibility study will be initiated by a meeting with contractors and haulers to gain their input and support for the program.

In order to provide an economic incentive for contractors to recycle, the rubble recycling facility will charge a reduced tipping fee for source-separated recyclables from construction sites. During initial stages of the facility operation, this may require that the program be subsidized by the county, similar to the subsidy given to the MSW recycling program. As rubble landfill tipping fees increase throughout the region, and additional markets for recycled materials are established, the requirement for subsidies should be reduced. The economic incentive of the free market should result in a significant increase in the recycling of rubble waste over the planning period. Alternatively, the county may evaluate the applicability of flow control to enhance the economic viability of the proposed facility.

A facility for producing an alternative daily cover material would process the entire rubble waste stream through large shredders, and the rubble would be handled using front-end loaders and cranes. The facility would also require sufficient space for storage pads and bins.

5.7 YARD WASTE

Backyard composting and leaving grass clippings on the lawn will continue to be encouraged as the preferred method of managing yard waste. The County will continue public outreach to promote backyard composting. An expanded publicity program explaining the merits of not bagging grass clippings and backyard composting will be continued.

Collection and transportation are the most costly elements of a yard waste management program. The County has held meetings with community organizations to discuss the possibility of implementing neighborhood yard waste recycling sites. Correspondence with these communities will continue, and technical assistance will be provided throughout the planning period to expand the neighborhood composting program.

An additional market which Charles County is well positioned to utilize is the farming community. Farmers will be encouraged to work with local haulers and landscaping/tree trimming companies to utilize their yard wastes in manure pits, compost piles, and soil incorporation.

An estimated 8 percent of the municipal waste generated in Charles County is yard waste. Charles County plans to recycle virtually all of this material by 2010 through its mulch and composting operations, and through the efforts of private companies in the county that will continue to produce mulch from wood waste obtained from landscaping, tree trimming, and maintenance contractors.

5.8 LAND DISPOSAL FACILITIES

Charles County will continue to provide disposal capacity for municipal solid waste throughout the planning period. Reliance on disposal facilities in other counties or states can mean the loss of control over the availability of capacity and the charges that will be incurred for disposal.

Regional landfill solutions could be considered if firm commitments for capacity and tipping fees can be obtained for the planning period. However, the Southern Maryland region is far from resolving this issue. Charles County will continue its participation in regional efforts for waste disposal planning.

5.8.1 Municipal Sanitary Landfill

The Charles County Landfill will provide the County with disposal capacity for county-generated solid waste for approximately 30 years, assuming 50 percent of the rubble is landfilled and a solid cover material is used. The landfill is projected to reach capacity in 2025, at which time a new municipal landfill is required to be operational. The estimated date for the County Landfill to reach capacity has been extended recently due to a lesser quantity of municipal solid waste entering the facility. The established tipping fee of $57.00 has made it more attractive for haulers to dispose of solid waste in other jurisdictions where the fees are considerably less. Thus, the estimated life of the County Landfill has been extended contingent upon the disposal of the majority of bulk commercial wastes outside of the County.

Charles County will continue to evaluate options for maximizing the disposal capacity and useful life of the landfill. Alternatives to be evaluated will include use of alternate daily cover materials such as foams, synthetic granular materials, and geosynthetics, and landfill mining.

The County will reevaluate the acceptance of asbestos wastes at the landfill. If feasible, a specific asbestos disposal area, with appropriate operating procedures, will be established at the facility. This would provide the County positive control to ensure asbestos disposal capacity is available at a reasonable cost, rather than relying on out-of-county facilities.

5.8.2 Rubble Landfills

Based on the current tipping fee of $57 and the environmental service fee of $62, nearly all commercial rubble waste is transported out-of-county for disposal. Therefore, the life of the County Sanitary Landfill has been extended 2025. Should the amount of rubble waste delivered to County landfill increase significantly, the county may conduct a feasibility study to evaluate the construction and operation of a rubble landfill and the associated processing technology. The need for disposal could be significantly reduced through the implementation of a rubble recycling facility.

A new rubble landfill would be under public ownership. The facility will be sited in accordance with the siting criteria presented in Chapter 4, and constructed and operated in compliance with all state and county regulatory criteria previously discussed.

The process of siting, permitting and constructing a new rubble landfill will take several years. Two years are projected for the siting and land acquisition process, which will allow for extensive public review and input, including workgroup meetings, public meetings and public hearings. Two years should be allotted for the permitting process. This process will include a detailed hydrogeologic site evaluation and detailed design of the facility; with review periods for citizen groups, county personnel and the MDE. The new MDE regulations for the construction of a rubble landfill facility require the facility to have a liner and leachate management system. Construction of the first cell of the rubble landfill and ancillary facilities is projected to take one year.

Under the authority granted in Section 9-210 of the Environment Article of the Maryland Annotated Code, the County, via this Plan, may designate certain types of waste that may or may not be accepted at a rubble landfill permitted by MDE within its jurisdictional limits. Pursuant to that authority, a rubble landfill in Charles County may accept the following wastes for disposal:

- Land-clearing debris as defined in *COMAR* 26.0-4.07.11B
- Acceptable demolition debris as defined in *COMAR* 26.04.07.13B(2)(a)
- Acceptable construction debris as defined in *COMAR* 26.04.07.13B(3)(a)

An unlined rubble landfill in Charles County is prohibited from accepting asbestos waste. A rubble landfill in Charles County is prohibited from disposing of household appliances, white goods, and tires.

As previously mentioned, a rubble landfill is not necessary to accomplish the goals of the Comprehensive Solid Waste Management Plan. However, a feasibility study may be conducted if the acceptance of rubble material begins to significantly increase, therefore reducing the expected time of operation of the current landfill facility.

5.9 SLUDGE

Currently, an estimated 3000 dry tons per day of wastewater treatment sludge is land-applied in the County. Approximately 85 percent of the sludge that is land-applied is generated within the County (Mattawoman WWTP). The remaining 15 percent is imported from the Blue Plains WWTP in Washington, D.C.

The land application of sludge is regulated by the MDE, including the review and issuance of individual site permits. Currently, there are 64 farm sites and 9 reclaimed gravel mines permitted for land application throughout the County. Charles County citizens have raised concerns that the land application process is not adequately supervised or regulated by the MDE, which could result in environmental problems, such as sludge runoff and odors.

The County issued a contract for the construction of additional sludge management facilities at the Mattawoman WWTP, including lime stabilization, thickening/dewatering, odor control, and storage tanks.

In 1994, the County initiated a *Comprehensive Sludge Management Plan*. The Plan projected sludge volumes to be managed as well as evaluated disposal/land application and storage alternatives. The Plan evaluated the environmental protectiveness of the land application program and recommended changes, where appropriate. This effort included county participation in the permitting and inspection of storage and land application sites.

5.10 HOUSEHOLD HAZARDOUS WASTES

The County will continue holding periodic household hazardous waste collection days in order to divert these materials from the landfill and potential illegal dumping. The feasibility of establishing a permanent

receiving and processing facility at the landfill will also be evaluated. The public information program will incorporate a household hazardous waste component which will provide assistance in identifying these materials, as well as information on proper handling, storage and disposal procedures. Through the public information program, citizens and businesses will be encouraged to use non-toxic materials, as possible, for activities such as cleaning, painting and yard maintenance. A reference list of these "environmentally sensitive" products will be included in the plan, and updated as necessary.

5.11 CONTROLLED HAZARDOUS SUBSTANCES

Industries and commercial establishments in the County that generate and ship controlled hazardous substances, including special medical wastes, are closely regulated by the Hazardous Waste Program of MDE's Waste Management Administration, and are not under the jurisdiction of this plan. Each shipment must be manifested, and volumes and types of materials reported to the MDE. No additional actions for hazardous waste management are recommended under this plan; however, the County may address the management of controlled hazardous substances under a separate plan.

5.12 OTHER WASTES

Miscellaneous or special solid wastes that must be managed include asbestos, dead animals, tires, septage, water treatment sludge, and agricultural wastes. Existing management practices for these wastes were described in Section 3.6 of Chapter 3, and proposed management practices for these wastes were described in Table 5-1 of this chapter.

All asbestos wastes generated within the County are currently exported to out-of-county land disposal facilities. As discussed in the land disposal section of this chapter, the County will reevaluate provisions for the disposal of asbestos wastes at the Charles County landfill. However, there currently seems to be little need for the disposal of asbestos due to the ban of asbestos building materials.

Current practices employed for the disposal of dead animals are adequate, and will be continued for the planning period.

The current ban on landfilling tires will be continued. Tires will be collected at the landfill and service facilities and taken out-of-county to a processing facility.

Currently, no water treatment plant residues are generated or disposed within the County. Sewage is currently collected and processed at the Mattawoman WWTP; this practice will be continued throughout the planning period.

Current practices for the disposal of agricultural waste in the county are adequate and will be continued for the planning period.

5.13 LITTER CONTROL

The County enacted the Environmental Crimes Task Force to coordinate the County efforts for minimizing litter and illegal dumping in Charles County. The Task Force emphasizes public education and

enforcement of policies regarding litter and illegal dumping. The County will continue to monitor the effectiveness of the program, and make improvements, as required, throughout the planning period.

5.14 PUBLIC INFORMATION PROGRAM

As discussed throughout this chapter, an effective public information and education program is the key to the success of many of the components of the integrated solid waste management plan, including waste reduction and reuse, residential and commercial recycling, and household hazardous waste management. The County's Comprehensive Solid Waste Management public information and education plan addresses the following issues:

- Source Reduction
- Residential Recycling
- Commercial Recycling
- Yard Waste Composting
- Household Hazardous Waste
- Municipal Solid Waste Landfill
- Rubble
- Recycling/Processing
- Material Recovery Facility (MRF)

The County will continue its participation with regional efforts for public education and information programs.

5.15 FINANCING

The County plans to finance capital improvements and operating expenses for the solid waste program through the solid waste management fund based on solid waste fees collected at the Charles County Landfill and an annual environmental services fee on improved properties. The waste management fund will be supplemented by general revenues and bond issues as required for major expenditures for expanding the current landfill site. Table 5-2 presents a detailed breakdown of estimated capital and operating costs for implementation of the recommended solid waste program for the planning period.

Construction of new cells at the Charles County Landfill are approved within the County's 5-year Capital Improvement Plan.

It is imperative that costs for solid waste management are kept separate from general revenue taxes; in this way, citizens are made aware of the actual cost of the program, and the County has the flexibility to institute financial incentives for waste reduction and recycling, such as volume-based billing. When citizens and businesses are reminded by each month's bill of the growing solid waste management costs, there will be more public support for recycling and other programs that will ultimately help control costs. In addition, under this "user pays" system, commercial establishments have an incentive to initiate

programs that will lower their monthly solid waste bill. As previously discussed, the implementation of a volume-based billing system is recommended as an incentive for waste reduction and recycling.

The County's recycling program is funded by the enterprise fund termed the "Environmental Service Fund". It derives its revenue from a separate line item on the property tax bill as a flat fee that is currently $62.00 per improved property. The assessment generated $2.2 million in FY 2001. Expenditures for recycling operations are approximately $1.7 million per year. The remaining balance is distributed for several other environmental programs that include funding for the Littler Control Program and the NDPES program.

5.16 LEGISLATIVE INITIATIVES

Meeting certain goals and objectives presented in Chapter 1 will require modifications or additions to county regulations and policies, including the following:

- Establish County policies to ensure that the goals and objectives of this Plan are achieved.

- Establish a mechanism for County approval of solid waste facility permit applications in order to certify conformance with this Plan, prior to application to the MDE. Approval must include adequate public notice and public hearings.

- Eliminate government-imposed impediments to the use of recycled products, and encourage the use of recycled product through government procurement regulations. The municipalities will be encouraged to establish a "buy recycled" policy for supplies.

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GLOSSARY

Aeration - The process of exposing waste material, such as compost, to air to promote aerobic decomposition. *Forced aeration* refers to the use of blowers in compost piles.

Aerobic - A biochemical process or condition occurring in the presence of oxygen.

Agricultural Waste - "Domestic animal manure or residuals in liquid or solid form generated in the production of poultry, livestock, fur-bearing animals, and their products. Agricultural waste includes residuals generated in the production and harvesting but not of subsequent processing of all agricultural, horticultural, or aquacultural commodities. Agricultural waste does not include land clearing debris unless the cleared land is intended solely for agricultural purposes." (*COMAR* 26.04.07.02)

Air Classification - A process in which a stream of air is used to separate mixed material according to the size, density and aerodynamic drag of the pieces.

Anaerobic - A biochemical process or condition occurring in the absence of oxygen.

Baler - A machine used to compress recyclables into bundles to reduce volume. *Balers* are often used on newspaper, plastics and corrugated cardboard.

Biodegradable Material - Waste material which is capable of being broken down by microorganisms into simple, stable compounds such as carbon dioxide and water. Most organic wastes, such as food wastes and paper, are *biodegradable*.

Biosolids - A recently adopted industry term for wastewater treatment sludge.

Borrow Pit- A facility that provides daily cover and capping material for sanitary landfills. Heavy equipment and adequate roads are required for the excavation and transport of earth materials that are mined for landfill cover.

Bulking Agent - A material used to add volume to another material to make it more porous to air flow. For example, municipal solid waste may act as a *bulking agent* when mixed with water treatment sludge.

Bulky Waste - Large items of refuse including, but not limited to, appliances, furniture, large auto parts, non-hazardous construction, demolition materials, trees, branches and stumps which cannot be handled by normal solid waste processing, collection and disposal methods.

Buy-Back Center - A facility where recyclable materials are bought from citizens. The materials are collected in separate disposal containers for different categories of recyclable materials.

Co-composting - Simultaneous composting of two or more waste types.

Co-disposal Plants: Facilities that burn sewage sludge combined with either prepared processed or unprocessed municipal solid waste.

Co-fired Plants- Facilities that burn coal and highly processed RDF.

Co-generation- The production of electric power or steam for sale by a non-utility which is then sold to a regulated utility in accordance with contracted guidelines.

Commercial Waste - Waste materials originating in wholesale, retail, institutional or service establishments, such as office buildings, stores, markets, theaters, hotels or warehouses.

Commingled Recyclables - A mixture of several recyclable materials in one container.

Compactor - Power-driven device used to compress materials to a smaller volume.

Compost - The relatively stable decomposed organic material resulting from the composting process. Also referred to as humus.

Composting - "The process in which organic solid waste is biologically decomposed under controlled conditions to yield a nuisance-free humus-like product." (*COMAR* 26.04.07.02)

Construction and Demolition Waste - Materials resulting from the construction, remodeling, repair or demolition of buildings, bridges, pavements and other structures.

Corrugated Paper - Paper or cardboard manufactured in a series of wrinkles or folds, or into alternating ridges and grooves.

Cullet - Clean, generally color-sorted, crushed glass used to make new glass products.

Curbside Collection - Programs where recyclable materials are collected at the curb, often from special containers, to be brought to various processing facilities.

Decomposition - Breaking down into component parts or basic elements

Diversion Rate - A measure of the material being diverted for recycling compared with the total amount that was previously thrown away.

Drop-off Center - A method of collecting recyclable or compostable materials in which the materials are taken by individuals to collection sites and deposited into designated containers.

Emission - Discharge of a gas into atmospheric circulation.

Enterprise Fund - A fund for a specific purpose that is self-supporting from the revenue it generates.

Ferrous Metals - Metals that are derived from iron. They can be removed using large magnets at separation facilities.

Flow Control - A legal or economic means by which waste is directed to particular destinations. For example, an ordinance requiring that certain wastes be sent to a combustion facility is waste *flow control*.

Garbage - Spoiled or waste food that is thrown away, generally defined as wet food waste. It is used as a general term for all products discarded.

Ground water - Water beneath the earth's surface that fills underground pockets (known as aquifers) and moves between soil particles and rock, supplying wells and springs.

Hammermill - A type of crusher or shredder used to break up waste materials into smaller pieces.

Hazardous Waste - Waste material that may pose a threat to human health or the environment, the disposal and handling of which is regulated by federal law.

Hazardous Waste Landfill. A sanitary (lined) landfill that accepts hazardous waste. Hazardous waste may pose a threat to human health or the environment; therefore, the handling and disposal of the waste is strictly regulated by federal law. Waste processing procedures and facilities are highly dependant on the type of waste disposed at the landfill.

Heavy Metals - Hazardous elements including cadmium, mercury and lead which may be found in the waste stream as part of discarded items such as batteries, lighting fixtures, colorants and inks.

High Grade Paper - Relatively valuable types of paper such as computer printout, white ledger, and tab cards. Also used to refer to industrial trimmings at paper mills that are recycled.

Humus - Organic materials resulting from decay of plant or animal matter. Also referred to as compost.

Incinerator. A facility in which the combustion of solid waste (e.g., municipal, medical) occurs. The recovery of energy from the combustion process may or may not occur. Incinerators are generally classified as a mass-burn facility , a refuse derived fuel facility, or waste to energy facility.

> ***Mass-Burn Facility***. An incinerator where the incoming waste is not processed prior to combustion is a mass-burn facility. Bulky and non-processible objects (e.g., white goods, furniture, etc.) are removed prior to processing; however, the waste is not

shredded or separated further. A mass-burn facility may or may not provide energy recovery from the combustion process. The components of a mass-burn facility include facilities for waste handling and storage, a combustion unit, energy recovery (optional), ash collection, and air emission pollution control equipment.

Refuse Derived Fuel Facility. An incinerator where the incoming waste is processed prior to combustion to improve the fuel properties of the waste is a refuse derived fuel (RDF) facility. The purpose of a RDF facility is recover energy from the combustion of waste. After the removal of non-processible waste and bulky items, the waste is shredded and screened to produce RDF. RDF consists of waste materials which are usually one to six inches in length. Ferrous material is removed from the RDF by magnetic separators and collected for shipment to scrap metal markets. Components of a RDF facility include facilities for waste handling and storage, a combustion unit, energy recovery, ash collection, and air emission pollution control equipment.

Waste-to-Energy Facility (WTEF) . A centralized facility that reduces the quantity of MSW and recovers energy (as steam or electricity) through the combustion of MSW. A WTEF generally includes the following components: (1) a waste handling and storage facility (e.g., storage pit, cranes, front-end loaders, etc.); (2) a combustion unit; (3) energy recovery facilities (boiler, turbine, generator, etc.); (4) ash collection; and (5) air emission pollution control equipment (e.g. bag house, electrostatic precipitators, scrubbers, etc.). A WTEF may be either a mass-burn or a refuse derived fuel facility.

Incinerator Ash - Remnants of solid waste after combustion, including non-combustibles (e.g., metals) and soot.

Industrial Waste - "Any liquid, gaseous solid, or other waste substance, or combination thereof, resulting from: a) any process of industry, manufacturing, trade or business; or b) the development of any natural resource, including agriculture." (*COMAR* 26.08.01.01)

Infectious Waste - "Any waste that comes from a hospital, clinic, or laboratory and that is known or suspected to be contaminated with organisms capable of producing disease or infection in humans. Infectious waste includes disposable equipment, instruments, utensils, contaminated needles, scalpels, and razor blades, human tissue and organs that result from surgery, obstetrics, or autopsy, feces, urine, vomitus, and suctionings, live vaccines for human use, blood and blood products, laboratory specimens such as tissue, blood elements, excreta, and secretions." (*COMAR* 26.04.07.02)

Institutional Waste - Waste materials originating in schools, hospitals, prisons, research institutions and other public buildings.

Integrated Solid Waste Management - A practice of using several alternative waste management techniques to manage and dispose of specific components of the municipal solid

waste stream. Waste management alternatives include source reduction, recycling, composting, energy recovery and landfilling.

Intermediate Disposal - "The preliminary or incomplete disposal of solid waste including, but not limited to, transfer stations, incineration, or processing." (*COMAR* 26.04.07.02)

In-Vessel Composting - A composting method in which the compost is produced in an enclosed mechanical reactor under controlled environmental conditions.

Land-Clearing Debris- A facility for the land disposal of land clearing and naturally occurring debris**.** Land-clearing wastes must be compacted to the greatest extent possible, and thus may include processing equipment such as grinders crushers, and shredders. These facilities do not require liners.

Landfill - (Sanitary Landfill) "an engineered method of disposing of solid wastes on land in a manner that minimizes public health and environmental hazards, and is designed, installed, and operated according to the provission of these regulations." (*COMAR* 26.04.07.02)

Leachate - Liquid that has percolated through solid waste or another medium and has extracted, dissolved, or suspended materials from it, which may include potentially harmful materials. *Leachate* collection and treatment is of primary concern at municipal waste landfills.

Magnetic Separation - A system to remove ferrous metals from other materials in a mixed municipal waste stream. Magnets are used to attract the ferrous metals.

Manual Separation - The separation of recyclable or compostable materials from waste by hand sorting.

Mass Burn - A municipal waste combustion technology in which the municipal solid waste is burned in a controlled system without prior sorting or processing.

Materials Recovery Facility (MRF)- A centralized facility that receives, separates, processes and/or market recyclable materials that have been previously separated from the municipal solid waste stream. A MRF for separated recyclables can be designed to handle all types of recyclables or just certain categories (e.g., paper, corrugated, plastics, glass, steel, aluminum, etc.), and may include a variety of processing equipment such as balers, crushers, air classifiers, magnetic separators, optical separation systems (for glass), and loading and transportation equipment.

Mechanical Separation - The separation of waste into various components using mechanical means such as cyclones, trommels and screens.

Methane - An odorless, colorless, flammable and explosive gas produced by municipal solid waste undergoing anaerobic decomposition. *Methane* is emitted from municipal solid waste landfills.

Microorganisms - Microscopically small living organisms that digest decomposable materials through metabolic activity. *Microorganisms* are active in the composting process.

Mixed Waste Processing Facility (MWPF). A centralized facility that receives, separates, processes and/or markets recoverable fractions of municipal solid waste, including recyclable materials, combustible materials and compostable materials. Processing equipment may include balers, crushers, air classifiers, magnetic separators, optical separation systems (for glass), rotating screens (trommels), wood grinders, compactors and loading and transportation equipment.

Modular Incinerator - Smaller-scale waste combustion units prefabricated at a manufacturing facility and transported to the Municipal Waste Combustion (MWC) facility site.

Monitoring Well - "Any hole made in the ground to examine groundwater." (*COMAR* 26.04.07.02)

Municipal Solid Waste Composting - The controlled degradation of municipal solid waste after some form of preprocessing to remove non-compostable inorganic materials.

Mulch - Ground wood waste used as a protective ground covering around plants to prevent evaporation of moisture and freezing of roots and to nourish the soil.

Municipal Sanitary Landfill - An engineered solid waste acceptance facility permitted under the requirements of MDE. The facility is designed, installed, and operated to minimize public health and environmental hazardous. The municipal sanitary landfill is the final disposal site for wastes generated by a community with the exception of those wastes specifically prohibited by MDE and Charles County regulations.

Municipal Solid Waste - Includes non-hazardous waste generated in households, commercial and business establishments, institution and light industrial wastes, agricultural wastes, mining waste and sewage sludge.

Municipal Solid Waste (MSW) Drop-off Center- A facility where MSW can be dropped off by individual citizens at the County's sanitary landfill or at regional drop-off centers; includes vehicle access to disposal containers.

Municipal Solid Waste Landfill- A county owned, centralized facility for the long-term land disposal of MSW without creating nuisances or hazards to public health or safety. A state-of-the-art municipal waste landfill includes the following technologies and operating features: (1) covering the disposed MSW with clean soil or other suitable cover material at the end of each

day; (2) composite, double, or double composite liners; (3) leachate collection and storage systems; (4) leachate treatment; (5) landfill gas control and recovery; (6) proper closure and capping of filled landfill cells; and (7) environmental protection monitoring (i.e., check of incoming landfill wastes for hazardous or other unsuitable materials, groundwater monitoring wells, domestic water supply monitoring, etc.). Operation of a municipal waste landfill requires heavy machinery for distributing and compacting the MSW; excavating; hauling and stockpiling cover material; and constructing new landfill cells and closing old landfill cells.

Open Dump - "A land disposal site that is not designed and operated in accordance with the requirements for a sanitary landfill as defined in COMAR

Organic Waste - Waste material containing carbon. The organic fraction of municipal solid waste includes paper, wood, food wastes, plastics and yard wastes.

Participation Rate - A measure of the number of people participating in a recycling program compared to the total number that could be participating.

Processing Facility - A combination of structures, machinery, or devices used to reduce or alter the volume, chemical, or physical characteristics of solid waste. For the purpose of these regulations, collection points serving rural residential areas are not considered to be processing facilities, provided that solid waste is not transferred from collection vehicles to another transportation unit. A generator who processes his or her own solid waste at the site of generation and disposes of the processed solid waste off the site of generation at a disposal site permitted by the Department is not considered to be a processing facility." (*COMAR* 26.04.07.02)

Recyclables - Materials that still have useful physical or chemical properties after serving their original purpose and that can, therefore, be reused or remanufactured into additional products.

Recycling - The process by which materials otherwise destined for disposal are collected, reprocessed or remanufactured and reused.

Recycling Drop-off Center- A facility where recyclable materials can be dropped-off for collection by the agency. Facilities similar to MSW drop-off center (and could be combined with an MSW, yard waste, or waste oil and antifreeze drop-off center), including separate disposal containers for different categories of recyclable materials.

Refuse - See Solid Waste

Refuse-Derived Fuel (RFD)- Product of mixed waste processing system in which certain recyclable and non-combustible materials are removed, and the remaining combustible material is converted for use as a fuel to create energy.

RDF, Coarse - Shredded municipal waste with minimal separation of recyclable materials.

RDF, Prepared - Municipal waste is shredded and mechanically processed to remove recyclable metals and glass. Optionally the material can be further shredded to produce a "fluff", or compacted into pellets prior to incineration.

Residential Waste - Waste materials generated in single and multiple-family homes.

Residue - Materials remaining after processing, incineration, composting, or recycling have been completed. *Residues* are usually disposed of in landfills.

Resource Recovery - A term describing the extraction and utilization of materials and energy from the waste stream. The term is sometimes used synonymously with energy recovery.

Resource Recovery Facility - "A processing facility at which component materials of solid waste are recovered for use as raw material or energy sources." (*COMAR* 26.04.07.02)

Retention Basin - An area designed to retain runoff and prevent erosion and pollution.

Reuse - The use of a product more than once in its same form for the same purpose; e.g., a soft-drink bottle is reused when it is returned to the bottling company for refilling.

Rubble Material Recovery Facility- A centralized facility that receives, separates and processes land-clearing and construction and demolition (LC&C&D) debris, such as trees, brush, rock, concrete, asphalt, brick, plaster and steel. Rubble processing may utilize crushers and grinders to reduce the volume of LC&C&D wastes, and thus maximize the efficiency and handling of such wastes. LC&C&D wastes can be processed for reuse and recycling (e.g., crushed rock, wood compost, scrap metal, etc.) or for disposal in a rubble landfill.

Scrap - Discarded or rejected industrial waste material often suitable for recycling.

Scrap Tire Collection Facility. A facility for the collection and temporary storage of scrap tires.

Septage - Material removed from chemical toilets, septic tanks, seepage pits, privies or cesspools.

Sewage - "The water-carried human, domestic and other wastes and includes all human and animal excreta." (*COMAR* 26.04.02.01)

Sludge - A semi-liquid residue remaining from the treatment of municipal and industrial water and wastewater.

Sludge Storage Facility. A facility designed to hold (temporarily) sewage sludge for a period of time prior to disposal, processing, or land application.

Soil Liner - Landfill liner composed of compacted soil used for the containment of leachate.

Solid Waste - "Any garbage, refuse, sludge, or liquid from industrial, commercial, mining, or agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage or in irrigation return flows." (*COMAR* 26.03.03.01)

Solid Waste Acceptance Facility - "Any landfill, incinerator, transfer station, or processing facility whose primary purpose is to dispose of, treat, or process solid waste." (*COMAR* 26.04.07.02)

Solid Waste Management - "The systematic administration of activities which provide for the collection, source separation, storage, transportation, transfer, processing, treatment, re-use, or disposal of solid waste." (*COMAR* 26.03.03.01)

Source Reduction - The design, manufacture, acquisition and reuse of materials so as to minimize the quantity and/or toxicity of waste produced. *Source reduction* prevents waste either by redesigning products or by otherwise changing societal patterns of consumption, use and waste generation.

Source Separation - The segregation of specific materials at the point of generation for separate collection. Residences source separate recyclables as part of a curbside recycling program.

Special Medical Waste - See Infectious Waste.

Special Waste - Refers to items that require special or separate handling, such as household hazardous wastes, bulky wastes, tires and used oil.

Solid Waste Transfer Station. A centralized facility where waste is unloaded from several small collection vehicles and loaded into larger vehicles for hauling to processing or disposal facilities; could include the use of loading and compacting machinery.

Subtitle C - The hazardous waste section of the Resource Conservation and Recovery Act (RCRA).

Subtitle D - The solid, non-hazardous waste section of the Resource Conservation and Recovery Act (RCRA).

Tipping Fee - A fee, usually dollars per ton, for the unloading or dumping of waste at a landfill, transfer station, recycling center, or waste-to-energy facility; also called a disposal or service fee.

Transfer Station -A centralized facility where waste is unloaded from several small collection vehciles and loaded into larger vehicles for hauling to processing or disposal facilities; could include the use of loading and compacting machinery.

Tub Grinder - Machine to grind yard and wood wastes for mulching, composting or size reduction.

Variable Container Rate - A charge for solid waste services based on the volume of waste generated measured by the number of containers set out for collection.

Volume Reduction - The processing of waste materials so as to decrease the amount of space the materials occupy, usually by compacting or shredding (mechanical), incineration (thermal), or composting (biological).

Waste Oil and Antifreeze Drop-off Facility- A facility where used motor oil and antifreeze can be dropped-off for collection by the agency or private operator, includes vehicle access to drop-off tanks for oil and antifreeze.

Waste Stream - A term describing the total flow of solid waste from homes, businesses, institutions and manufacturing plants that must be recycled, burned or disposed of in landfills; or any segment thereof, such as the "residential waste stream" or the "recyclable waste stream."

Waste-to-Energy - Conversion of solid waste to energy, generally through the combustion of processed or raw refuse to produce steam and electricity.

Water Table - Level below the earth's surface at which the ground becomes saturated with water. Landfills and composting facilities are designed with respect to the water table in order to minimize potential contamination.

Wet Scrubber - Anti-pollution device in which a lime slurry (dry lime mixed with water) is injected into the flue gas stream to remove acid gases and particulates.

Wetland - Area that is regularly wet or flooded and has a water table that stands at or above the land surface for at least part of the year. Coastal wetlands extend back from estuaries and include salt marshes, tidal basins, marshes and mangrove swamps. Inland non-tidal wetlands consist of swamps, marshes and bogs. Federal regulations apply to landfills sited at or near wetlands.

White Goods - Large household appliances such as refrigerators, stoves, air conditioners and washing machines.

Windrow - A large, elongated pile of composting material.

Yard Waste - leaves, grass clippings, brush, prunings, and other natural organic matter discarded from yards and gardens.

Yard Waste Composting Facility- A centralized facility that receives and processes yard waste (e.g., grass clippings, weeds, brush, trees, leaves and other plant materials) into compost. Centralized (e.g., municipal, commercial) yard waste composting facilities usually require several acres of land to grind, pile and turn the yard waste during the decomposition process, and to process and store the final composted product. Facilities that accept trees, stumps, brush and other wood wastes require the use of chippers and grinders for processing. Front-end loaders are

used to move and pile the wastes for composting, and front-end loaders and specially designed windrow turning machines are used to periodically turn the compost piles. Trommels and other screening machines are used to sort and remove large materials from the final compost product. Centralized facilities would also include drop-off and staging areas, as well as compost pick-up areas.

Yard Waste/Sludge Composting Facility- A facility where yard wastes and sewage sludge are combined to create a compost. The yard waste is processed in a similar manner to that described for yard waste composting, but is mixed with nutrient-rich sewage sludge. The facilities used for yard waste/sludge composting are similar to those used for yard waste composting, except that composting with sludge may require building the compost piles over a paved pad and enclosing the piles for odor control.

Yard Waste Drop-off Facility- A facility or at regional drop-off centers are where citizens can drop-off compostable yard waste. Facilities include roll-off containers and vehicle access.

Many of the definitions in this glossary were obtained from EPA's Decision Maker's Guide to Solid Waste Management, Volume II, (EPA 530-R-95-023), 1995. Project Co-Directors: Phillip R. O'Leary and Patrick W. Walsh, Solid and Hazardous Waste Education Center, University of Wisconsin-Madison/Extension.

Title 26
DEPARTMENT OF THE ENVIRONMENT

Subtitle 03 WATER SUPPLY, SEWERAGE, SOLID WASTE, AND POLLUTION CONTROL PLANNING AND FUNDING

Chapter 03 Development of County Comprehensive Solid Waste Management Plans

Authority: Environment Article, Title 9, Subtitle 5, Annotated Code of Maryland

.01 Definitions.

A. In this chapter, the following terms have the meanings indicated.

B. Terms Defined.

(1) "County" means any of the 23 Maryland counties or Baltimore City.

(2) County Plan.

(a) "County plan" means a comprehensive plan for adequately providing throughout the county (including all towns, municipal corporations, and sanitary districts) the following facilities and services by public or private ownership:

(i) Solid waste disposal systems;

(ii) Solid waste acceptance facilities; and

(iii) Systematic collection and disposal of solid waste, including litter.

(b) "County plan" includes all revisions to the plan.

(3) "Department" means the Department of the Environment.

(4) "Governing body" means the Board of County Commissioners, or the County Executive and Council, or the Mayor and City Council of Baltimore.

(5) "Litter" means any waste materials, refuse, garbage, trash, debris, dead animals, or other discarded material.

(6) "Refuse" means any solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations, or from community activities, which:

(a) Is discarded, or is being accumulated, stored, or physically, chemically, or biologically treated before being discarded; or

(b) Has served its original intended use and sometimes is discarded; or

(c) Is a manufacturing or mining by-product and sometimes is discarded.

(7) "Revision" means either an adopted amendment to, or a periodic update of, a county plan.

(8) "Solid waste" means any garbage, refuse, sludge, or liquid from industrial, commercial, mining, or agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage or in irrigation return flows.

(9) "Solid waste acceptance facility" means any sanitary landfill, incinerator, transfer station or plant, whose primary purpose is to dispose of, treat, or process solid waste.

(10) Solid Waste Disposal System.

(a) "Solid waste disposal system" means any publicly or privately owned system that:

(i) Provides a scheduled or systematic collection of solid waste;

(ii) Transports the solid waste to a solid waste acceptance facility; and

(iii) Treats or otherwise disposes of the solid waste at the solid waste acceptance facility.

(b) A solid waste disposal system includes each solid waste acceptance facility that is used in connection with it.

(11) "Solid waste management" means the systematic administration of activities which provide for the collection, source separation, storage, transportation, transfer, processing, treatment, re-use, or disposal of solid waste.

.02 General Provisions.

A. Each county shall maintain a current, comprehensive, solid waste plan which covers at least the succeeding 10-year period. Each plan

shall be prepared in accordance with these regulations, and shall be arranged with an introduction and five chapters as set forth in Regulation .03.

B. Each county plan shall include all or part of the subsidiary plans of the towns, municipal corporations, sanitary districts, privately owned facilities, and local, State and federal agencies having existing, planned, or programmed development within the county to the extent that these inclusions shall promote the public health, safety, and welfare. These subsidiary plans may be incorporated by reference into the county plan.

C. The Department may require the installation of a solid waste disposal system, if deemed necessary, after considering the factors listed in Environment Article, Title 9, Subtitle 5, Annotated Code of Maryland. The Department may permit the establishment of a solid waste acceptance facility without a collection and transportation system if a solid waste disposal system is either not available or not required to be installed in the area.

.03 Plan Content.

A. The introduction shall contain:

(1) A statement certifying that the plan has been prepared in accordance with these regulations and that it has been officially adopted by the governing body of the county; and

(2) The letter of approval from the Department.

B. Chapter One shall contain a:

(1) Statement of the county's goals regarding solid waste management, the objectives and policies necessary to achieve these goals, and a discussion of the conformance of these objectives and policies with those of State, regional, and local comprehensive land use plans and programs;

(2) Brief discussion, with charts, of the structure of the county government as it relates to solid waste management; and

(3) Brief discussion of State, federal and local agencies, laws, and regulations which affect the planning, establishment, and operation by the county of solid waste disposal systems.

C. Chapter Two shall contain a:

(1) Table which shows the county's present and projected population (if more than one set of projections is shown, the set upon which the plan is based shall be noted);

(2) Map which shows the location of municipalities and federal facilities within the county;

(3) Discussion of current county zoning requirements as they relate to solid waste management activities; and

(4) Discussion of the current status of the county comprehensive land-use plan, including the date that the plan was adopted and last updated.

D. Chapter Three shall contain:

(1) A table that shows the existing and projected, for at least the succeeding 10-year period, annual generation (in tons, cubic yards, or gallons, as appropriate) of:

(a) Residential (household, domestic) wastes;

(b) Commercial wastes;

(c) Industrial (nonhazardous) solids, liquids, and sludges;

(d) Institutional (schools, hospitals, government buildings) waste;

(e) Land clearing and demolition debris (rubble);

(f) Controlled hazardous substances (CHS);

(g) Dead animals;

(h) Bulky or special wastes (automobiles, large appliances, etc.);

(i) Vehicle tires;

(j) Wastewater treatment plant sludges;

(k) Septage; and

(l) Other wastes (water treatment plant sludges, residues collected by a pollution control device, agricultural wastes, mining wastes, litter, street sweepings, recreational wastes, etc.) unless they are generated in insignificant quantities. However, the Department may require the county to substantiate any omission.

(2) A discussion of the bases for the data presented in the table required by §D(1).

(3) A discussion of the types and quantities of solid waste, if significant, which are entering or leaving the county for processing, recovery, or disposal.

(4) A description of existing solid waste collection systems, including service areas.

(5) Information concerning each existing public or private solid waste acceptance facility (incinerators, transfer stations, major composting sites, sanitary and rubble landfills, dumps, major resource recovery facilities, CHS facilities, injection wells, and industrial waste liquid holding impoundments) including:

(a) Its location on a map;

(b) Its Maryland grid coordinates;

(c) Its size in acres;

(d) The types and quantities of solid wastes accepted;

(e) Ownership;

(f) Permit status; and

(g) Anticipated years of service life remaining.

E. Chapter Four.

(1) Chapter four shall contain an assessment (using a narrative description, maps, charts, and graphs as appropriate) of the county's needs to alter, extend, modify, or add to existing solid waste disposal systems during the next 10 years.

(2) The assessment above shall use, when appropriate, the background information contained in chapters one, two, and three.

(3) The assessment shall consider the constraints imposed upon the establishment of solid waste acceptance facilities by:

(a) Topography;

(b) Soil types and their characteristics;

(c) Geologic conditions;

(d) Location;

(e) Use and depth of aquifers;

(f) Location of wetlands;

(g) Location of surface water sources and their flood plains and watersheds;

(h) Existing water quality conditions;

(i) Incompatible land use;

(j) Planned long-term growth patterns;

(k) Federal, State and local laws and areas of critical State concern (as designated by the Department of State Planning).

(4) The assessment shall evaluate:

(a) The use of source separation and source reduction programs to reduce the quantities of solid wastes which shall be collected for disposal;

(b) Resource recovery options to reduce land disposal capacity needs;

(c) Consumer education programs, and cooperation with appropriate suppliers for the purchase of recycled products to encourage, and help create a market for, resource recovery and source separation programs;

(d) The need for disposal capacity for asbestos;

(e) Programs and procedures needed to respond to the unplanned (emergency) spillage or leaking of hazardous wastes within the county; and

(f) Whether existing local master plans and zoning regulations provide for the appropriate siting, operation, or both, of solid waste management systems or facilities.

F. Chapter Five.

(1) Chapter five shall contain the county's plan of action with respect to all types of solid waste and all phases of solid waste management.

(2) The plan of action in §F(1), above, shall cover at least the succeeding 10-year period and, at a minimum, shall:

(a) Discuss the solid waste disposal systems and solid waste acceptance facilities, both public and private, which will be in use during the planning period, including proposed systems and facilities;

(b) Provide a mechanism for managing each of the waste streams identified in §D(1);

(c) Demonstrate, through tables, charts and graphs, that the sizing, staging, and capacity of all systems and facilities in §F(2)(a) and

(b), above, will be adequate for the county's needs during the planning period;

(d) Establish schedules for placing new public or private solid waste disposal systems or solid waste acceptance facilities into operation, including a description of necessary actions and their timing, to bring the county's solid waste disposal systems into compliance with the mandates of pertinent federal and State laws, and any permits or orders issued under these laws;

(e) Describe provisions and methods for financing existing and proposed solid waste disposal systems, including planning and implementation;

(f) Include a projected closure date for each public solid waste acceptance facility which is scheduled to cease operations during the planning period, the projected use of each closed site, and the relationship of that use to the county's comprehensive land use plan; and

(g) Discuss changes in programs, plans, regulations, and procedures as a result of the assessment conducted under §E, above.

.04 Technical Requirements Applicable to County Plans.

A. Maps in the county plans shall be of sufficient scale and clarity to clearly show the required information.

B. Projections in the county plans shall be given for at least the succeeding 10-year period at intervals of not more than 5 years.

.05 Plan Revisions.

A. Except as provided in §B, below, each county plan shall be:

(1) Revised if deemed necessary by the Department;

(2) Reviewed in its entirety at the interval specified by Environment Article, Title 9, Subtitle 5, Annotated Code of Maryland; and

(3) Revised to include the installation or extension of either a solid waste acceptance facility, or solid waste disposal system, before the issuance of a permit by the Department under Environment Article, Title 9, Subtitle 2, Annotated Code of Maryland.

B. Exceptions. A revision for the sole purpose of including a private facility is not necessary if the:

(1) Facility accepts only wastes generated by the owner's operations;

(2) Facility is in general conformance with the management mechanism described in Regulation .03F(2)(b); and

(3) Information listed in Regulation .03D(5) is provided for the facility when the county plan is reviewed and revised in accordance with §A(2), above.

C. Revisions pertaining to county plans shall be adopted and submitted in accordance with the following process:

(1) The county shall solicit input concerning the proposed revision from each of the entities listed in Regulation .02B, above, and from any other entity likely to be affected by the proposed revision.

(2) The county shall provide a reasonable opportunity for a public hearing concerning the proposed revision to the county plan. Prince George's County and Montgomery County are required by Environment Article, Title 9, Subtitle 5, Annotated Code of Maryland, to conduct a public hearing. The Department, the public, and the entities listed in Regulation .02B shall receive prior notice of a hearing.

(3) Following the public hearing or public meeting, or a decision not to conduct a public hearing or public meeting, the governing body of the county shall adopt the revision and submit seven copies of it to the Department. This submittal shall be accompanied by a discussion of substantive issues raised at the public hearing or public meeting, and how they were resolved.

D. The Department shall distribute copies of the adopted revision to the Departments of Natural Resources, State Planning, and Agriculture, for review and comment.

E. The Department shall, within 90 days after receiving the submission, approve, disapprove, or approve in part, the adopted revision unless the review period has been extended under Environment Article, Title 9, Subtitle 5, Annotated Code of Maryland. If the submittal is disapproved in whole, or in part, the Department shall, in a written notice to the county, clearly define the inadequacies of the submittal, and provide a suggested outline of the tasks needed to improve the submittal so that it can be approved by the Department.

F. The governing body shall, for 6 months following the disapproval, have the right to appeal the Department's action by sending a written notice of appeal to the Department's Office of Hearings at 201 West Preston Street, Baltimore, Maryland 21201.

Administrative History

Effective date: January 1, 1971
Regulations .01—.05 repealed and new Regulations .01—.05 adopted effective November 4, 1985 (12:22 Md. R. 2104)

Chapter recodified from COMAR 10.17.08 to COMAR 26.03.03

PROJECTED POPULATION INTERPOLATION SUMMARY
FOR CHARLES COUNTY
1990 THROUGH 2010

Year	Housing Units	Persons per Housing Unit	Population
1990	34,487	3.03	101,154
1991	35,181	3.02	104,083
1992	35,950	3.01	105,816
1993	36,898	3.01	107,507
1994	37,892	3.00	109,340
1995	38,952	2.94	111,633
1996	40,010	2.93	113,557
1997	41,220	2.91	115,075
1998	42,504	2.90	117,963
1999	43,958	2.88	120,946
2000	45,211	2.87	122,852
2001	46,261	2.85	124,842
2002	47,311	2.84	126,832
2003	48,361	2.82	128,822
2004	49,411	2.81	130,812
2005	50,461	2.79	132,802
2006	51,511	2.78	134,792
2007	52,561	2.76	136,782
2008	53,611	2.75	138,772
2009	54,661	2.75	140,762
2010	55,632	2.74	142,752

SOURCE:

Values for 1990 housing units and 1990 through 1999 population are from the U.S. Census Bureau.

All other values are from the Charles County Department of Planning and Growth Management , Planning Division.

COUNTY COMMISSIONERS OF CHARLES COUNTY, MARYLAND

RESOLUTION NO. 2001-68

WHEREAS, the County Commissioners of Charles County, Maryland, by the authority of Environmental Article, Title 9, Subtitle 5, of the Annotated Code of Maryland, and Title 26, Subtitle 3, Chapter 3, of the Code of Maryland Regulations (COMAR), as well as other provisions of the Annotated Code of Maryland and the provisions of the Code of Public Local Laws of Charles County, are directed to adopt and submit to the Maryland State Department of the Environment a comprehensive plan for the provision of adequate solid waste management systems throughout the County to include all towns and municipal corporations within Charles County; and

WHEREAS, said Comprehensive Solid Waste Management Plan has been prepared and submitted to the County Commissioners of Charles County, Maryland, in order that it may be adopted by said County; and

WHEREAS, said Comprehensive Solid Waste Management Plan has been reviewed by the County Commissioners of Charles County, Maryland, and it appearing that all requirements of State law have been complied with; and

WHEREAS, the Charles County Commissioners held a public hearing on the draft Comprehensive Solid Waste Management Plan for 2000-2010 on February 26, 2001 to solicit public comment; and

WHEREAS, the County Commissioners of Charles County, Maryland, held a public work session on all public testimony and all comments submitted during the public record on April 9, 2001 and subsequently on the April 23, 2001; and

WHEREAS, changes to the text, tables and figures were made to the Charles County Comprehensive Solid Waste Management Plan 2000-2010, dated February 26, 2001, subsequent to comments receive during the period of public record; and

WHEREAS, the said solid waste management plan is found to be consistent with land use master planning in Charles County; and

WHEREAS, after serious deliberation and study the County Commissioners of Charles County, Maryland, are of the opinion that it is in the best interest of the citizens of Charles County that the Comprehensive Solid Waste Management Plan be adopted and approved; and

NOW, THEREFORE BE IT RESOLVED, this 23rd day of April, 2001, by the County Commissioners of Charles County, Maryland, that the Comprehensive Solid Waste Management Plan, dated September 1, 1992, and its subsequent amendments as approved by the Maryland Department of the Environment is hereby repealed; and

BE IT FURTHER RESOLVED, this 23rd day of April, 2001, that the attached Charles County Comprehensive Solid Waste Management Plan 2000-2010 , dated April 23, 2001, known as Exhibit A, is hereby adopted by the County Commissioners of Charles County, Maryland and IT IS FURTHER RESOLVED, that said Plan, replace and supersede all previous plans.

FURTHER, IT IS RESOLVED, that the Charles County Comprehensive Solid Waste Management Plan 2000-2010, dated April 23, 2001, shall be submitted to Maryland State Department of the Environment for review and approval.

IT IS FURTHER RESOLVED, that if any clause, sentence, article, section, part or parts of said Comprehensive Solid Waste Management Plan 2000-2010 shall be held unconstitutional or invalid for any reason whatsoever, such unconstitutionality or invalidity shall not effect the

validity of the remaining parts of said Plan or any action thereof; the County Commissioners of Charles County, Maryland, hereby declare that they would have adopted the remaining parts of said Plan, or any section thereof, if they had known any such clause, sentence, article, section, part or parts of said Plan would be declared unconstitutional or invalid.

FINALLY, IT IS RESOLVED that said Comprehensive Solid Waste Management Plan 2000-2010 shall take effect on the 23rd day of April, 2001.

COUNTY COMMISSIONERS OF
CHARLES COUNTY, MARYLAND

Murray D. Levy, President

(not present)

Robert J. Fuller

James M. Jarboe

Wm. Daniel Mayer

(not present)

Allan R. Smith

ATTEST: Shirley M. Gore, Clerk

Exhibit A: Comprehensive Solid Waste Management Plan 2000-2010, *dated April 23, 2001*

Appendix C

HAZARDOUS WASTE CODES

DOO1:	Characteristics of ignitability
D002:	Characteristics of corrosivity
D003:	Characteristics of reactivity
D004:	EP Toxicity - Arsenic
D005:	EP Toxicity - Barium
D006:	EP Toxicity - Cadmium
D007:	EP Toxicity - Chromium
D008:	EP Toxicity - Lead
D009:	EP Toxicity - Mercury
F001:	The following spent halogenated solvents used in degreasing: tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; and sludges from the recovery of these solvents in degreasing operations.
F002:	The following spent halogenated solvents tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluroethane, orthodichlorobenzene, and trichlorofluoromethane; and the still bottoms from the recovery of these solvents.
F003:	The following spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; and the still bottoms from the recovery of these solvents.
F005:	The following spent non-halogenated solvents; toluene, methyl ethyl ketone, carbon disulfide, isobutanol, and pyridine; and the still bottoms from the recovery of these solvents.
K045:	Spent carbon from the treatment of wastewater containing explosives.

P012: Arsenic pentoxide, Athrombin, AVITROL, Aziridene, AZIFOS, Azophos, BANTU

P030: Cyanide salt mixtures not otherwise listed

U002: Acetone (I)

U007: Acrylamide, Acetylene tetrachloride, Acetylene trichlorid

U019: Benzene (I,T)

U031: n-Butyl alcohol (I)

U069: Di-n-butyl phthalate

U080: Dichloromethane, Dichloromethylbenzene

U088: Diethyl phthalate

U102: Dimethyl phthalate

U133: Hydrazine (R,T)

U159: Methy ethyl ketone (MEK) (I,T)

U228: Trichloroethene, Trichloroethylene

PROCEDURES TO HANDLE NON-HAZARDOUS CONTAMINATED SOILS

The presence of any free liquid shall be determined by EPA SW-846 method 9095, paint filter liquids test.

The total petroleum hydrocarbon (TPH) concentrations shall be determined by using EPA method 418.1 for chemical analysis of water and wastewater, which has been modified for use with soil.

The sum of benzene, toluene, ethyl benzene, and xylene (BTEX) concentrations shall be determined by using EPA SW-846 method 5030/8020.

The soil shall be tested for total organic halogens (TOX) in accordance with test methods contained in EPA SW-846.

The soil contaminated by leakage from an underground tank shall be tested for EP toxicity using EPA SW-846 method 1310. If the tank contained motor oil the testing may be limited to heavy metals; tanks that contained all other petroleum products shall be tested for lead and any other compound covered by that test known to be present.

The soil contaminated as a result of anything other than leakage from an underground storage tank shall be tested by the toxicity characteristic leaching procedure (TCLP). If other TCLP constituents are not tested for, the generator shall be able to certify that the soil is not a hazardous waste, and certify that it did not contain those constituents not tested.

In the case of soil contaminated with gasoline, the testing requirements for EP toxicity or TCLP for lead, TOX, or the paint filter liquids test may be waived, if the request for disposal contains sufficient documentation that the material was contaminated with unleaded gasoline, does not contain any halogenated hydrocarbons, or free liquids.

Waiver for BTEX testing requirements may be granted, if the generator can provide sufficient documentation that the material does not contain any benzene, toluene, ethyl benzene, or xylenes, and the amount of material to be disposed is less 20 cubic yards.

Disposal criteria for petroleum contaminated soils is outlined below.

- Soils failing the EP toxicity or the TCLP test shall be managed in accordance with the Maryland hazardous waste management regulations.

- Soils exhibiting greater than 100 milligram per kilogram (mg/kg) of TOX may not be disposed of until separate approval from the MDE is granted. This request shall document the cause for the high TOX level.

- If the concentration of total BTEX is greater than 10 mg/kg or TPH is greater than 500 mg/kg, the soil cannot be disposed of in any sanitary or industrial landfill unless the facility permit expressly allows such disposal.

- If the concentration of TPH is less than 500 mg/kg and total BTEX is less than 10 mg/kg, the disposal of the contaminated soil may be approved for permitted sanitary or industrial landfills equipped with liners and leachate collection systems.

- If the concentration of TPH is less than 100 mg/kg and total BTEX is less than 10 mg/kg, the disposal of the contaminated soil may be approved for any permitted sanitary or industrial landfill.

- Soil containing less than 50 mg/kg TPH and total BTEX less than 10 mg/kg may be used as clean fill. This soil, however, may not be disposed of closer than 100 feet of any regularly flowing surface water body or river, 500 feet of any well, spring or other groundwater source of drinking water, and 200 feet from any residence, school, hospital, nursing home or recreational park area. In addition, if the soil is not to be disposed of on the generator's property, the generator shall notify the property owner that the soil is contaminated and with what it is contaminated.

- Contaminated soil resulting from an underground storage tank release or from a spill may be considered for a variance from these guidelines where the total volume of contaminated soil from a cleanup site is less than 20 cubic yards, and the contaminated soil is not a hazardous waste. This variance may only be granted by the MDE.

- The disposal of contaminated soil resulting from an emergency cleanup of a spill of petroleum products, provided that the waste is non-hazardous as defined by the Maryland hazardous waste management regulations or by federal regulations under Subtitle C, RCRA.

FORM A

MRA Tonnage Reporting System
County Solid Waste Accounting Form

County: CHARLES

Solid Waste Contact Name: DENNIS FLEMING Telephone # 301-870-2778

Recycling Coordinator Name: LOWRY PHELPS Telephone # 301-870-2778

Reporting Period: January 1 - December 31, 1999 (Specify Year)

(Z) = (Y) + (X)

NAME AND LOCATION OF DISPOSAL FACILITY ACCEPTING WASTE COLLECTED IN YOUR COUNTY	TYPE OF FACILITY	TOTAL WASTE COLLECTED IN THE COUNTY FOR DISPOSAL	NON-MRA WASTE (TONS)	MRA WASTE (TONS)
CHARLES COUNTY SANITARY LANDFILL	LANDFILL	37,842.38		37,842.38
PRIVATE HAULERS EXPORTING	OUT OF STATE FAC.	50,000.00		50,000.00*
TOTAL				87,842.38

RECEIVED
DEC 0 1 2000
PLANNING DEPARTMENT

* MRA WASTE = **Maryland Recycling Act Waste - waste that conforms to the Maryland Recycling Act definition of "solid waste stream".**

Please provide a brief explanation of how the weight of NON-MRA waste was determined.

I certify, to the best of my knowledge, that the tonnage claimed on this form is accurate and based upon actual records maintained by solid waste acceptance facilities. These tonnage records will be made available to MDE for auditing purposes, if requested.

*ESTIMATED

Signature | CHIEF Title | Date

SECTION 2 - OPTIONAL
Other Recycling (Non-MRA)

Non-Maryland Recycling Act Material	Residential Recycling (TONS)	Commercial Recycling (TONS)	Total (TONS)
Scrap Metal			
Scrap Automobiles			
Antifreeze (9.8 lbs./Gal.)		39.20	39.20
Waste Oil (7 lbs./Gal.)		375,200.00	375,200.00
Asphalt			
Concrete			
C & D Debris		90,000.00	90,000.00
Sewage Sludge		3,665.00	3,665.00
Landclearing Debris (stumps)			
Soils			
Other:			
Other:			
Other:			
Total Non-MRA Recycling		547,265.00	547,265.00

Maryland Recycling Act Recycling Rate

	TOTAL
A = MRA Waste (Form A, (X))	87,842.38
	36,266.14
	124,108.52
	30%

*** Check the appropriate Rate Formula: MRA Recycling Rate = B / (A + B) X 100**

or

MRA Recycling Rate = B / (A + B - C) X 100 for MSW Composting

I certify, to the best of my knowledge, that the tonnage claimed on this form is accurate and based upon actual records maintained by the County. These tonnage records will be made available to MDE for auditing purposes, if requested.

_____ CHIEF _____

Signature Title Date

FORM B

Maryland Recycling Act (MRA)
Tonnage Reporting System
County Recycling Accounting Form

SECTION 1:MRA Recyclables (B)

CATEGORY	Maryland Recycling Act Recyclables	Residential Recycling (TONS)	Commercial Recycling (TONS)	MRA Tons Recycled (TONS)
METALS	Aluminum Cans			
	Mixed Cans (AL & Tin/St)	290.81	142.76	433.57
	Tin/Steel Cans			
	White Goods	2496.53	916.39	3412.92
	Lead Acid Batteries	29.99	259.19	289.18
	Other:			
PAPER	Newspaper	3587.03	4744.51	8331.54
	Old Corrugated Cardboard	180.91	9180.91	9361.82
	Office/Computer Paper	30.09	1154.57	1184.66
	Magazines			
	Mixed Paper	1.50	2828.60	2830.10
	Other:			
COMPOST/MULCH (Yard)	Grass			
	Leaves			
	Brush and Branches			
	Mixed Yard Waste	8144.95		8144.95
COMPOST/MULCH (Other)	Wood Waste			
	Solid Waste Compost*			
	Other: Pallets		31.40	31.40
PLASTIC	Mixed Plastic	863.65	245.82	1109.47
	Plastic Code #			
	Plastic Code #			
GLASS	Mixed Glass	48.80	18.46	67.26
	Green Glass			
	Brown Glass			
	Clear Glass			
OTHER MATERIALS	Commingled Containers			
	Textiles/Cloth		89.00	89.00
	Tires	388.98	16.02	405.00
TIRES TO CEMENT KILNS	Total Wt. =			
	Other: Protein		575.27	575.27
TOTAL	Total MRA Recycling Materials	16063.24	20202.90	**36266.14**

* **Report here only that portion of compost which is marketed**

val\Tonsrpt\FormB 7/28/94